Canada Mortgage and Housing Corporation
Société canadienne d'hypothèques et de logement

CMHC Helping to house Canadians

# 1987 Monitoring of the CMHC RNH Demonstration Program

## Volume 1: Program Findings

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# Executive Summary

## EXECUTIVE SUMMARY

The Demonstration Program provides building materials and technical assistance to selected participants to help them build their own houses. The Program is a development of ideas first tested in the Alberta Rural Home Assistance Program (RHAP) and a similar program developed by the Northwest Territories Housing Corporation, the Homeownership Assistance Program (HAP). This report presents the results of an assessment of 16 projects funded under the Rural and Native Demonstration Program (RNH), and two projects funded by CMHC and the RHAP Program.

The objective of the Demonstration Program is to develop and test the capacity of this clientele to build their own houses by providing materials and expert help.

Specifically, the Program is a demonstration of the following ideas:

- using local volunteer labour to construct the units;
- providing supervision and training through an on-site construction manager;
- providing an up-front forgivable loan for materials, services and land (where required);
- motivating households to solve their housing problems through their own organization and effort; and
- reducing long-term dependency on government-subsidized housing.
- to research and develop building "kits" and other systems which lend themselves to simplified erection procedures and self-help labour.

The Demonstration Program is scheduled to deliver a total of 500 housing units to rural areas of Canada over five years commencing in 1986. This planned rate of production has so far been maintained, with 95 houses being delivered in 1986 and 98 in 1987.

### Evolution of the Program

Several changes have been made in Program for 1987, based on experience gained in 1986. These include:

- additional community selection criteria, to assure that the Program is welcomed in its areas of operation;
- extension of the forgiveness period on titled land to 25 years, coupled with a right of first refusal for CMHC during this period;
- minor changes to house design criteria; and
- an increase in the budget, from $40,000 to $41,500 per unit.

### 1987 Budget

A capital construction budget of $4,150,000 was approved for the 1987 construction year, sufficient for the construction of 100 houses, at an average cost of $41,500. Original allocations were slightly altered, and the net result is that 98 units will be con-

structed under the 1987 allocation. Details of actual allocations are shown in Table 1, pg. 13 of this volume.

Alberta has received a ten-unit allocation, with delivery again taking place through the Alberta RHAP Program, but costs this year are being cost-shared on a 75/25 basis, unlike the 50/50 basis adhered to in 1986.

### Delivery Patterns

The delivery of most projects followed the pattern outlined in the Operational Guidelines: CMHC project officers in Local Offices took the lead in hiring construction managers, obtaining designs, hiring subcontractors and tendering materials packages while construction managers provided on-site leadership.

Regional offices tended to have a less active hands-on involvement this year than in 1986. The involvement of Local Office (LO) staff in the projects varied considerably, from field delivery of projects to a more administrative role. In both years, Native associations were generally invited by CMHC to take part in the selection of communities, projects and clients, although in Ontario and Saskatchewan, involvement was mainly by municipal or local councils.

### Construction Managers

In all projects, the 1987 experience mirrors that of 1986 in underlining the importance of construction managers (CM's) to the success of projects, especially in their functions as trainers and motivators of the clients. While all CM's appeared to have extensive construction skills, some were not skilled as trainers or motivators and a few seemed to be unaware of the importance of these functions.

The importance of the ability of CM's to lead and motivate is underlined by the field surveyors' observations that the projects with problems in construction quality tended to be those where CM's had been unable to provide a continuous presence or adequate training.

In some projects this year, CM's were hired for periods that did not cover the full term of the construction process and this placed an additional burden on clients and CMHC staff towards the end of the construction process. Many contracts expired in January or February and some as early as December. In other projects it was found difficult to find CM's who were available for the full construction period, or at the right time, with similar effects.

### Community and Project Selection

Although most of the selection criteria have been respected in most areas, there are significant exceptions. Analysis indicates that rural, rather than remote, communities were often selected in some provinces, especially in the Maritimes.

Of the three selection criteria, the most difficult to satisfy appears to be the requirement to avoid communities that already have regular RNH homeownership or

rental units. It is becoming increasingly difficult to satisfy this criterion and many Local Offices found that it was difficult, and sometimes impossible, to find small and remote communities where the RNH program had not been applied.

It is not yet clear whether the placement of Demo units in an RNH community does, in fact, have negative effects. If there is justification for dropping the guideline criterion, it will be far easier to find new communities for the Program in the future.

The guidelines express a preference for communities that have no active housing market, so that the Demo program will not be seen as competitive. Although three 1987 projects appear to be located in areas with active markets, no negative effects have so far been observed.

The validity of the guideline recommendation for a project size of 3-7 units in one community has been reinforced in this year's program. Large projects led to situations where construction managers did not have the time to carry out their training and motivational tasks; while small or scattered projects make it difficult to absorb the time and cost overheads of construction managers and CMHC staff and also create difficulties in generating volunteer enthusiasm for the projects. There were eight projects this year that were excessively small or scattered, and their inclusion constitutes the most serious deviation from the intent of the Program.

### Clients

Clients satisfied selection criteria for income and housing need. The average of annual household incomes reported was $12,863, while average households consisted of 2.2 adults and 2.2 children. Previous housing conditions reported included very few instances of affordability problems, but many cases of a combination of other problems, including crowding, health and structural problems. The old houses seen by the field surveyors were certainly very inferior accommodation, and there is no doubt that the clients were badly in need of housing assistance. No clients were currently living in subsidized housing.

Most clients expressed a high degree of satisfaction with the Program, and they indicated that acquaintances held a similarly positive view. In this year's Program, there were no reports of negative community reaction.

### Training

During the field work, an attempt was made to establish the approximate level of construction skills possessed by the clients and these indicate that an increase in skills has occurred. The construction training given to clients consisted mainly of on-site and hands-on training to groups and individuals, not formal off-site training. There were also a few cases of training for groups of clients. The reactions of clients indicate that the amount of training actually provided by CM's in 1987 may have been less than required.

### Land and Services

The acquisition of land has been problematic and has caused considerable delays in several projects, despite the much earlier approvals this year. Specific causes include the time required to acquire clear title, to sever lots from farmlands, and to obtain use of crown land. Such activities are not only time-consuming but expensive, since considerable legal work is involved.

Several offices have, however, reduced the financial burden that the purchase of land represented in 1986, by trying to limit clients to those who have their own land. The effect of this can be seen in the relatively low project expenditures for land in some projects. It is clear that this strategy is effective in reducing the burden on project funds. The effect on clients is not yet clear.

Houses in four projects are without sewer services, and in two more projects it is uncertain how long the use of temporary buckets will continue. Clients in eight projects are dependent on hauling water. This does not contradict the Guidelines, which state that servicing should be to community norms. In some areas, such as Saskatchewan and Manitoba, the lack of services is held to be a community norm.

### House Designs

House designs show considerable variety in configuration. The most common types are a single floor unit over a crawl space or a single floor unit over a basement. Many unit types are based on conventional RNH or locally-accepted designs. The Mesilinka clients designed their own, while Yukon clients have had the benefit of individual designs prepared by an architect.

The program has succeeded in building houses with typical sizes of 912 to 988 sq. ft. (the average of all units is 950 sq.ft.) within the cost limits. Typical Demo houses are large compared to some units being built by Native organizations in the same regions, and this may, to some extent, "spoil the market" for these latter types.

### Tendering And Materials Delivery

There was considerable variation in the approach used to obtain material prices. Some offices prepared detailed working drawings, specifications and comprehensive bills of materials, while others took a much simpler approach. Material package tenders were generally by invitation, a procedure that reduces time and expense and appears quite suitable for the modest scale of Demo projects.

### Construction Process

The Program requires that clients and/or their friends and relatives should carry out most of the construction, while some specialized work will have to be done by professionals, especially electrical work and the roughing-in of plumbing. This scenario has generally been followed, but there are regional variations -- contractors were used to build basements in the Maritimes and Quebec, for example, and some CMHC of-

fices believe strongly in the advisability of having professionals carry out drywall finishing.

Rough estimates of client participation in the construction process indicate a considerable diversity of effort. In some of the projects where participation was low (Preston, Parklands), clients were mainly mother-led families or senior citizens; in others (New Brunswick, Parklands, Baden and Mesilinka) the clients lacked time, or had no previous construction training. Fortunately, several of the projects with low client participation rates had a high rate of volunteer turnout, underlining the need for a good balance between client and volunteer participation.

### Construction Quality

Despite the consistent methodology used in the survey, the assessment of the overall quality of units is a very subjective procedure. After considerable debate, the field surveyors came to a consensus that there may have been a slight reduction in quality this year compared to 1986, probably reflecting the wider use of non-conventional construction techniques in 1987, the exceptional effort made by CMHC and clients in the start-up year of the Program, and the greater focus placed on technical aspects of the program in this year's monitoring work. In any case, the construction quality is quite satisfactory and is similar to that which might be expected from private-sector builders of low-cost houses in such areas.

### Program, Project and Unit Costs

Cost data were derived from the latest Commitment Authority forms available at the time of the interviews, while projects were very often still at the "soft" stage, modified according to final estimates provided by CMHC staff.

Costs in all except one project were within program limits. The Total Final Project Costs per unit, which are the expenditures made within official project budgets, varied from a low of $31,835 in Baden to a high of $50,496 in Letang, with a weighted average of $40,283. These data compare with a weighted average of $37,618 for units in the Alberta RHAP Program.

The most useful basis for comparing house costs, however, is the Net Construction Cost, which adds extra contributions, such as CMHC time and expenses, and removes the highly variable land and service costs from consideration. On this basis, Demo house costs vary from a low of $32,667 (Chetwynd) to a high of $60,920 (Old Crow); with a weighted average of $42,900. The comparable weighted average for Alberta RHAP units is $40,358.

Several strategies were used by Local Offices to keep project costs within limits. The Preston project repeated the pattern set in 1986, of assigning a Local Office inspector as CM, thereby transferring this cost from the project budget; and low CM expenditures were achieved in a number of other projects. The average project expenditure for CM fees and expenses was $2,597 per house. Other average expenditures of

interest include paid labour per house at $6,812 and materials expenditures (including the materials packages) at $25,451.

A comparison of Demo house costs with those of comparable units is of great interest, since it indicates the value of the voluntary aspect of the Demo Program. Approximate comparative prices have been obtained in several areas, often for RNH Homeownership units, but sometimes for private-sector equivalents. These data indicate that the Demo units represent an approximate cost saving varying from 16% to 60%. In our opinion, a saving of at least 40% over normal construction costs may be expected through the Demo Program approach.

### Other Issues

There are a number of subsidiary issues which are of interest:

*Understanding the Program*

There will always be variability in the quality of CM's and clients available, but all would benefit from a more complete explanation of the program objectives. We suggest, therefore, that orientation workshops should be provided for CM's and that simple promotional materials should be prepared for use with the CM's and clients. Such materials would also be useful for municipal or other local officials.

*Project Life Spans*

In those communities that are only accessible by winter road, late schedules created serious problems. In such cases, a strong case can be made for an overall project lifespan of 18 to 24 months. This would allow materials to be in place by the spring of the following year, and would reduce the problems that now occur in waiting for summer conditions to ship, then trying to squeeze construction into a very short time frame

*Maintenance*

It is difficult to ascertain whether clients are likely to have the ability to operate and maintain their homes, as required by the Program, and it will be advisable for CMHC to monitor this issue.

The few 1986 houses visited during the 1987 field work provide hopeful indications of future maintenance, but follow-up will be needed. The assessment of adequate maintenance is now a subjective process, and there are in any case no mechanisms for CMHC to take over a unit that is poorly maintained. The development of such a policy suggests ongoing administrative involvements and costs, as in the normal RNH program.

*Rehabilitation*

The principles developed in the Demo Program could usefully be applied to rehabilitation. An even more attractive option is to apply the principles (sweat equity and the use of a construction manager) developed in the Demo Program to the existing Residential Rehabilitation Assistance Program (RRAP), which has developed the specialized techniques and standards that are required for rehabilitation.

## Table of Contents, Volume 1


**Executive Summary** . . . . . i

**Table of Contents** . . . . . viii

**Acknowledgements** . . . . . ix

**1. Foreword** . . . . . 1

**2. Methods and Procedures** . . . . . 2

**3. Background of the Demonstration Program**

3.1 The Regular Rural and Native Housing program . . . . . 3
3.2 Origins of the RNH Demonstration Program . . . . . 3
3.3 Characteristics of the Demonstration Program . . . . . 5
3.4 1987 Changes in Operational Guidelines . . . . . 8
3.5 The Alberta Rural Home Assistance Program . . . . . 10

**4. National Findings**

4.1 Allocations to Regions . . . . . 13
4.2 Staffing and Roles . . . . . 14
4.3 Community and Project Selection . . . . . 18
4.4 Clients . . . . . 19
4.5 Training and Information Dissemination . . . . . 25
4.6 Land and Services . . . . . 28
4.7 House Designs . . . . . 30
4.8 Tendering and Materials Delivery . . . . . 41
4.9 Construction Process . . . . . 43
4.10 Construction Quality . . . . . 45
4.11 Program, Project and Unit Costs . . . . . 47
4.12 Other Issues . . . . . 52
4.13 Client Views . . . . . 54

**5. Conclusions** . . . . . 55

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*Although this project was funded by the Canada Mortgage and Housing Corporation, the views expressed in this report are the responsibility of the authors*

## Foreword

This report presents the results of an assessment of 16 projects funded under the Rural and Native Housing Demonstration Program (RNH), and two projects funded by CMHC and the Alberta Rural Home Assistance Program (RHAP).

The Demonstration Program provides building materials and technical assistance to selected participants to help them build their own houses. The Program is a development of ideas first tested in the RHAP Program and a similar program developed by the Northwest Territories Housing Corporation, the Homeownership Assistance Program (HAP). These ideas were subsequently endorsed by the Nielsen Task Force. Although low-income people living in rural and remote areas have traditionally constructed their own houses, they are generally of very poor quality and have limited longevity.

It is generally financially impossible for such people to build houses of adequate size and quality, and previous government efforts to provide contractor-built houses for them have proven to be expensive to build and to administer. Worse, conventional program approaches do not take advantage of the skills and energy of low-income rural and remote people, many of whom would still like to build their own houses. The result is to undercut the independence of such people and, in practical terms, to foster an attitude of indifference to the maintenance of their houses.

The objective of the Demonstration Program is to develop and test the capacity of this clientele to build their own houses by providing materials and expert help.

The 1987 Monitoring Report follows the approach taken in the 1986 report, and consists of four volumes. Volume 1 contains an overview of the operations of the Program, while Volume 2 provides details of each project and Volume 3 presents a collection of all the major housing designs used in the Program. Reference tables and copies of survey instruments are located in Volume 4.

## Study Methods and Procedures

This study has been based on file data collected from the National and Local Offices of CMHC and information gathered in the field. Sixteen RNH Demonstration projects were visited as well as two Alberta RHAP projects. Two Demonstration projects (Sheet Harbour and Sydney) had not been started during the field work period and were not visited; nor were two RHAP projects, one of which had not been started. In any case, the projects not visited contain only seven units, and therefore do not constitute a major proportion of either program.

Field data were gathered by means of semi-structured questionnaires designed for application at the Branch/Local Offices of CMHC, the project level and the house or client level. Field experience indicates that the questionnaires became more relevant and useful as we descended downwards in scale, towards the house and client level. Demo houses were photographed, inspected for quality and code violations, the homeowner interviewed and changes made to the original design were noted. Houses built under the 1986 Demo program that were close to the 1987 sites were also visited and given a skim review to obtain an assessment of the degree to which these are being added to and maintained.

In each project, efforts were made to visit at least one house of each type and to interview all the occupants living in them. In many projects, a 100% sample was achieved, but in others clients could not always be found, nor their houses visited. In any case, information about houses and their occupants is available for 69 of the 87 houses that were under construction at the time of the field work; a higher proportion than in the 1986 field work.

This is a monitoring study, with a descriptive, rather than deeply analytic approach, and is based on case study data gathered prior to the completion of projects. As such, much of the data does not satisfy the standards for statistical validity that would be required in a full-blown evaluation. Assessments of the proportion of on-site labour performed by various types of participants, for example, are based on the retrospective judgements of construction managers and are therefore very approximate in nature -- these data have nevertheless been included since the 1986 study showed them to be a useful comparative indicator of the character of these projects.

Responses of clients to the evaluative questions in the Client Surveys should also be treated as general indicators of opinions and trends, due to the small sample sizes and the variation in willingness to respond among some of the very varied cultural groups that form the Demo clientele. Finally, data on project costs are based on preliminary budget estimates, and final data on project costs will have to await the closing out of projects.

Despite these limitations and difficulties, the usual ones besetting a project that involves the collection of primarily "soft" data, we believe that this report fairly depicts what has taken place in the field.

# 3: Background of the Program

# 3. BACKGROUND OF THE DEMONSTRATION PROGRAM

## 3.1 The Regular Rural and Native Housing Program

The current RNH Program is based on a payment-to-income (or mortgage payment) formula developed to distribute the capital, operating and maintenance costs of a dwelling equitably between low-income families and the federal-provincial housing partnerships. This arrangement places the responsibility for capital funding and for monthly operating on the federal/provincial partnership, which then has to recover a portion of the monthly costs from the occupant. This process not only involves a subsidy for up to the 25-year life of the mortgage, but also requires a widespread and costly administrative organization. There is little in this arrangement to encourage the occupant to become self-reliant or to use family labour to maintain the dwelling.

## 3.2 Origins of the RNH Demonstration Program

CMHC's Rural and Native Housing Demonstration Program, established in 1986, was partially based on similar programs already being operated by the governments of Alberta and the Northwest Territories.

*Programs in the NWT*

The Government of the Northwest Territories introduced the Small Settlement Home Assistance Grant Program (SSHAG) in the early 1970's in order to reduce the pressure on public housing rentals. Under this program, clients able to construct their own houses from locally available materials -- usually logs -- were eligible for a grant of $10,000 (raised to $18,000 in 1981) for the purchase of manufactured goods and specialized services. In 1980, a NWT Housing Corporation (NWTHC) staff report on the program's implementation at Snowdrift, NWT, suggested that if all costs were counted, including administrative costs and federal manpower grants for skilled trainers, the real cost to the territorial and federal purse for each grant was close to $30,000.

In 1982, the NWTHC replaced SSHAG with a new program, called the Homeownership Assistance Program (HAP), the intention being to extend the program to larger centres and to introduce more flexible rules. The objective of HAP was essentially the same as that of SSHAG, but dropping the requirement for locally harvested material meant that it could be used in all areas of the NWT, and not only where good building logs were available. Thus, it became a significant component of the overall set of housing programs operated by the NWTHC.

*Similar Programs in Alberta*

The Alberta Department of Housing introduced a similar program, the Beaver Homes Program, in 1976. This was replaced by the Rural Home Assistance program (RHAP) in 1978.

In both the NWT and Alberta programs, the use of labour contributed by the homeowner meant greatly reduced costs.

*Economic Rationale*

A 1980 study of on-reserve family life suggested that wage income (that is, cash) made up only half of a family's real income; the balance was made up through farming, hunting and fishing for food, and through barter and the exchange of services. The low proportion of cash to non-cash income is a significant factor in most rural and remote areas.

The existing RNH Homeownership Program concentrates on the family's cash income and, by requiring monthly cash payments, tends to deplete an already scarce resource. The Demonstration Program, on the other hand, utilizes the non-cash resources of a family to provide construction labour, leaving the family's cash income intact. Under the new program, the homeowner undertakes the usual homeowner's responsibility for operating and maintaining the dwelling, thus relieving the federal/provincial partnership of the cost of subsidy and administration.

The NWT and Alberta experience with similar programs indicated that the capital cost of constructing a dwelling equal in size and quality to others in the neighbourhood has been reduced by about 50 per cent. Therefore, the homeowner and his family have contributed 50 per cent of the value of the dwelling. This is a very significant saving to governments; furthermore, the homeowner's substantial equity, to say nothing of the pride of ownership, is likely to provide the incentive for proper operation and maintenance of the dwelling.

*The Nielsen Task Force*

In 1984, the Nielsen Special Working Group on Housing noted the success of the NWT and Alberta programs, referring in particular to the savings achievable by trading the ongoing subsidy and administration costs of conventional public housing for a one-time grant.

The Working Group went on to comment on the deplorable housing conditions in remote and rural areas where this type of self-help housing could be most effectively introduced. It was also noted that the very low incomes typical of remote populations had resulted in a national rate of arrears of 30 per cent rate in current Rural and Native Housing programs. The Working Group concluded that a demonstration program should be undertaken to test the feasibility of a federal program similar to those in the NWT and Alberta. These problems have not eased over time - data from Manitoba indicates that current arrear rates vary between 40 and 77%.

*CMHC Action*

An earlier Cabinet decision, which had approved in principle a new RNH Demonstration Program, was re-confirmed in November, 1985, as part of a whole set of new housing initiatives, and the new program was announced by the Minister respon-

sible for CMHC in early 1986. Work on the development of the Demonstration Program began in early 1986 with the consideration of a number of alternative ways of delivering the program.

At first, it was thought that the fastest and most effective method of project delivery would be a highly centralized operation involving the shipping of components or semi- prefabricated units to sites. However, in a program where local involvement was considered essential in encouraging homeowners to take pride in their houses, this approach had the disadvantage of shutting out local associations and regional staff. It was also considered important that local people, by being intimately involved in the program, should develop a good understanding of the advantages, costs and responsibilities inherent in this form of tenure and would develop the skills required to maintain their units.

Consultation with CMHC regional staff, Provincial and Territorial authorities and with native groups suggested that regional administration of the program would be both workable and desirable. By mid-March, 1986, draft guidelines and procedures had been developed at CMHC National Office and distributed to Regional Offices for comment.

A submission was made to CMHC Management on May 27, 1986, requesting approval of an off-reserve Rural and Native Housing Demonstration Program that would be administered by CMHC Regional Offices, perhaps in cooperation with those Territorial and Provincial agencies that had comparable programs in place. As the program was to be distinct from line programs and was primarily intended to assess the potential of this method of delivering low-cost housing, funding was obtained under Section 37.1i of the Northern Housing Act (NHA) for demonstration work.

The submission was approved by CMHC Management, and an order-in-council approving the required funding for 1986 was obtained on July 23, 1986.

## 3.3 Characteristics of the Demonstration Program

The objectives of the RNH Demonstration Program are stated in the Program Guidelines as follows:

*1. To evaluate the effectiveness of the delivery of rural and native ownership housing through client self-help, with regard to:*

*using local volunteer labour to construct the units;*

*providing supervision and training through an on-site construction manager;*

*providing an up-front forgivable loan for materials, services and land (where required);*

*motivating households to solve their housing problems through their own organization and effort; and*

*reducing long-term dependency on government-subsidized housing.*

*2. To research and develop building "kits" and other systems which lend themselves to simplified erection procedures and self-help labour. For the purposes of the Demonstration Program, "kits" is defined as packaged building systems which include precut, partially pre-assembled components, complete with laymen's instructions.*

The Demonstration Program is scheduled to deliver a total of 500 housing units to rural areas of Canada over five years commencing in 1986. This planned rate of production has so far been maintained, with 95 houses being delivered in 1986 and 98 in 1987.

Households of all ethnic backgrounds are eligible for inclusion in the program, but in fact needy households in remote and rural areas tend to belong to Native and Metis communities. Though the program is designed to serve the low-income population, income limitations are applied to exclude families too poor to maintain a dwelling without an on-going subsidy.

Since it is mandatory that each participating family take an active part in the construction of its dwelling, selected households must be able to commit a considerable amount of their own time, or that of volunteers, to the project.

Participating families are provided with a materials package delivered to the site and the services of a construction manager to manage the project and to provide some training. The Program also covers pre-development expenses (legal fees etc.), the acquisition of land, the provision of skilled sub-trades, water and sanitary services and the payment of fees for construction management. No payment is offered for the household's labour, nor for other volunteer labour, and the household must supply appliances and furnishings.

All these costs are acknowledged by the homeowner in the form of a signed mortgage document or promissory note. This indebtedness is partially forgiven on an annual basis, so that in a number of years the dwelling was owned outright by the homeowner. This security is intended to discourage early profit-taking and to ensure that CMHC can recover the unit if it is abandoned within the limits of the forgiveness period. In 1986, the forgiveness period was five years, but for the 1987 program it was extended to 25 years, except for Crown Land where the five year provision remains in effect.

In order to qualify for the annual forgiveness, the homeowner has to occupy the dwelling and demonstrate that it is adequately maintained. Otherwise, the homeowner has all the usual rights associated with ownership, and if the dwelling is sold within the forgiveness period, the owner can take the profit from the transaction after paying off the residual debt to CMHC.

Rural and remote areas have no lack of land for the erection of dwellings, but it is not always possible to acquire sites where the land title allows for a mortgage to be placed on the dwelling. Crown land has therefore been leased for many clients in the program. The Demo Program is, according to CMHC Manitoba officials, the only

program available to help needy clients to live on Crown Land, since the regular RNH Program requires clear title or a long lease on such land.

By September 1986, the regions were calling for a clarification of acceptable ways of dealing with land title, and it was resolved that during the forgiveness period CMHC would retain the right to take back and re-assign a dwelling of a client who did not maintain or live in the dwelling. The policy was intended as a deterrent against premature sale of a dwelling where the homeowner could make a windfall profit. This was a particularly important consideration in areas where there was an established real estate market.

This problem was discussed in a memorandum from Project Implementation Division (PID) desk officers to the regional managers of operations (September 12, 1986). The following provisions outline the policy with respect to land title and mortgage requirements for the RNH Demonstration Program during the 1986/87 operations.

*A. Where the client has no land:*
*If necessary, CMHC may purchase or provide a lot on behalf of an eligible client. The title to the property should be registered in the client's name at the time of purchase. CMHC will take a mortgage on the property with the forecasted interest adjustment date being the estimated date of substantial completion. Where freehold title exists, a form of freehold mortgage should be used where the total amount of unit construction plus land cost is forgiven at a rate of 20 per cent per year over a five-year period.*

*B. Where the client has land:*
*Title to the property will remain in the client's name and CMHC will take a mortgage on the property with the forecasted interest adjustment date being the estimated date of substantial completion. Again, a form of freehold mortgage should be used where the total amount of unit construction cost is forgiven at a rate of 20 per cent per year over a five-year period. If any liens are registered against the client's property, these should be looked into and, if necessary, the regional solicitor's opinion should be obtained before deciding whether to proceed. It is not recommended that personal debts against the client's property be cleared by CMHC.*

*C. Where the client has leasehold property (registered planned subdivision):*
*The lease will remain in the client's name and the regional solicitor will be asked to review the lease and advise whether house construction could proceed and if a leasehold mortgage can be registered against the property. CMHC will take a leasehold mortgage on the property with the total amount of unit construction cost forgiven at a rate of 20 per cent per year over a five-year period.*

*D. Where the client is occupying crown land:*
*If possible, the client should have an occupancy or use permit or we should attempt to get a letter of comfort from the province or territory indicating that we may proceed to construct the demo units. The client will sign a promissory note, similar to the RRAP Agreement, which again will*

*forgive the total amount of unit construction cost at a rate of 20 per cent per year over a five-year period.*

The RNH Demonstration Program does not deliver a normal "builder's house", and the insurance safeguards available to a builder are not always available to government or unpaid labour. The following memorandum[1] discusses the policy, and problems that are being encountered in its implementation.

*Please be advised that we have obtained comprehensive general liability insurance against third-party claims through our Rural and Native Housing Demonstration projects. Present coverage under Policy No. CGLO23281 extends from June 15, 1986, to December 1, 1986, and will be extended at that time. Any claims should be filed in accordance with procedures in Manual 21-2, Section 21-2.2 11/1.*

*Although we have looked into comprehensive job site insurance against fire, theft, etc., we have found that the cost, deductibles and administrative requirements are prohibitive. Unless you feel it is necessary to explore this further on a regional level, we are recommending that you proceed with a "self-insured" policy and reserve some funds to enable some re-supply if necessary.*

*We have made some inquiries regarding the payment of Workman's Compensation fees for the client and any volunteer labourers but are told this is not possible if there are no earnings to insure. You may wish to pursue this further on a provincial basis, otherwise clients and volunteer helpers should be advised that they are not covered through the program. As indicated in the Construction Manager Contract, Item 9, the Construction Manager must pay his/her own Workman's Compensation fees.*

## 3.4 1987 Changes In Operational Guidelines

The 1987 Operational Guidelines contain several changes from the 1986 Guidelines, including the following (only major changes are shown):

### a) Community Selection Criteria

Several additional guidelines have been introduced in 1987, most of which reflect the adverse publicity engendered by two 1986 projects. These include provisions to select non-urban communities that do not have a housing market, to consult Native groups, provinces and municipalities and to keep MP's and Local Offices informed. Finally, the guidelines now explicitly caution Local Offices not to select communities where local acceptance cannot be obtained.

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1 Memorandum, R.. Stapledon to J.S. Morris, August, 1986

**b) House Design Criteria**

The 1986 Guidelines were explicit in recommending against the use of full basements. This has now been removed, while retaining the recommendation in favour of crawl spaces and PWF systems. This shift appears to be due to the strong local preference for basements in several locations (especially the Maritimes), and their relatively low marginal cost.

**c) Land**

Clauses dealing with land acquisition and tenure have been extended to include mention of a 25-year right of first refusal for CMHC.

**d) Commitment Authority Forms**

These have been modified for 1987 and are compared below (1987 categories have been slightly re-ordered to facilitate a comparison):

| **1986** | **1987** |
|---|---|
| Pre-development Expenses | Pre-development Expenses |
| Fees and Permits | Fees and Permits |
| Construction Manager | Const. Manager - Contract |
| | Const. Manager - Expenses |
| Land | Land |
| Materials Package | Materials Package |
| Materials Delivery | Extra Freight Costs |
| Site Preparation | |
| Foundations | |
| Site Services | |
| Labour | Specialized Labour Contracts |
| Tools | Tools |
| Equipment Rentals | |
| Other | |
| Contingency/Miscellaneous | Miscellaneous |

It will be noted that the main differences consist of the merging of Site Preparation, Foundations, Site Services and Labour into one Specialized Labour Contracts category. This reflects the concern of CMHC to minimize such expenses by making them even more visible.

**e) Title and Mortgage**

Major changes have been made to the provisions for titles and mortgages. The most important include the following:

*Extension of Forgiveness Period to 25 Years*

One of the main concerns of CMHC management in 1986 was the impact of the 5-year forgiveness provision, which arose from a negative community reaction to the Program in two communities. Although this was only a major problem in two areas, CMHC considered that a change in policy was required to forestall further problems

and the forgiveness period was therefore increased to 25 years except where the client has no legal interest in the land (on Crown land).

*Non-mortgage security*

Where a client does not have title to land, security is to be provided by a promissory note over a period of 5 years.

*Right of First Refusal*

A provision has been added giving CMHC the right of first refusal where a client wishes to sell. Under the new arrangement, CMHC has the right to place such a unit in the social housing portfolio, or to sell it on the open market. Guidelines indicate that managers should exercise this right where the sale price is more than 15% below similar units in the market area and where the sale may have a negative impact on the local housing market.

**f) Budget Increase**

In 1986, Regions were allocated funds sufficient for an all-inclusive average unit cost of $40,000. This has been increased to $41,500 in 1987.

## 3.5 The Alberta Rural Home Assistance Program[2]

The Rural Home Assistance Program (R.H.A.P.) is delivered by Alberta Municipal Affairs -- Housing Division.

Since R.H.A.P. is an ongoing and successful operation, Alberta was insistent that C.M.H.C. should not deliver the Demonstration Program in the province in competition with their program. C.M.H.C. therefore agreed to join the Alberta Program by contributing 75% of the cost of whatever units were designated as Demonstration units, while generally complying with the R.H.A.P. guidelines. These differ in several ways from those of the Rural & Native Demonstration Program.

The most important differences are:

1. The grant allowed towards the construction of a R.H.A.P. unit depends on whether it is located in a Metis Settlement or a remote community. In a Metis settlement, the grant is $30,500, based on the following general costs:

- Materials $17,000
- Plumbing (interior) $2,500
- Heating (forced air) $2,500
- Electrical $2,000

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2 Reegan McCullough, Alberta Municipal Affairs, contributed to the following text.

- Labour $6,500
- Total: $30,500

In addition to this, an extra $8,000 is provided annually to each settlement to allow for powerline extension work. This would equal approximately $1,600 per unit. Grant monies are also available for exterior water and sewer services ($30,000 being provided to each Settlement annually.)

In a remote community, $19,000 is provided towards the construction of a new home, based on the following general costs:

- Materials $14,800
- Heating (wood) $1,200
- Electrical $2,000
- Plumbing (rough-in) $1,000
- Total: $19,000

An additional $2,000 per unit is provided for power line extension work.

An amendment to the grant is available to allow for higher project costs associated with the transport of materials and the size of the house.

2. The client family is expected to provide some "sweat-equity" towards the project. This may not be possible if the clients are senior citizens, single parents or medically disabled. In the communities visited, they were required to contribute sixteen (16) days.

3. Kitchen cabinets and finishing work may be left up to the clients to ensure that the ceiling price is not exceeded.

4. To be eligible, an applicant/household must:

a) be a permanent resident of a Metis Settlement or designate remote community;

b) consist of at least one dependent or senior citizen;

c) have an adjusted household income below $18,000 per year; the adjustments are a $2,500 deduction for a spouse and $500 deduction for each dependent child; income assessment will be based on the previous year's income; family allowance payments are not included as income;

d) be in need of improved housing;

e) be approved on a priority basis by the local Housing Association; and,

f) have land upon which to build a house.

5. The Rural Home Assistance Program has not engaged in the "forgivable mortgage" and "right of first refusal" as advocated by C.M.H.C. Accordingly, there have not been any Demonstration units delivered to communities where clients have land title (about 15% of R.H.A.P. communities). It is their opinion that this is a fairly sophisticated process of ensuring that land will not be re-sold,

and it would be difficult to explain the mechanism and procedure to people who are not familiar with land transactions.

Houses in Kikino, Fishing Lake and other Metis Settlements were built by contract labour, with the clients doing some work where they were physically able in the preliminary clearing of site and powerline cuts, in keeping the site clear of builders' debris, and in the installation of their own kitchen cabinets, general finishing and painting, and the installation of other items that they were willing and able to provide.

Contract labour funds were recently added to the grant for Metis Settlements at the special request of the Federation of Metis Settlements. A four-year Carpentry Training Program had successfully developed licensed Journeyman Carpenters from each Settlement (approximately four from each Settlement) and the community leaders felt that their skills should be employed in the construction of the homes built each year. Unemployment is a major issue in each of these communities (70-80%) and the contract labour assistance provided regularly removes some people from the Social Assistance and Unemployment Insurance treadmills that they are dependent on.

R.H.A.P. has been delivered for over ten years and has witnessed many forms of construction labour assistance. This has ranged from sweat-equity to government-sponsored labour/training programs, and now to contract labour assistance. The program staff is proud of the Settlements' development of technical and administrative skills and is pleased with the quality of homes being constructed by the local people.

The Rural Home Assistance Program is delivered by a total field staff of eight, and it relies heavily on the administrative skills of the thirty-seven (37) client Housing Associations. The heuristic approach, which thrives on the involvement of local communities, has translated into a successful Housing Program.

# 4: National Findings

# 4. NATIONAL FINDINGS

## 4.1 Allocation To Regions

Approval was obtained in the amount of $4,150,000 for the 1987-88 construction year. The total number of units to be constructed in 1987-88 was limited to 100, with an average cost of $41,500 per housing unit. This follows closely the 1986 allocations, which were also for a total of 100 units, but at an average cost of $40,000. 1987 funds were allocated to the CMHC Regions as indicated in Table 1.

**Table 1 Program Allocations By Region**

| | Original Allocation | | Final Allocation | |
|---|---|---|---|---|
| | Units | $ | Units | $ |
| Newfoundland | 5 | | 13 | |
| PEI | 3 | | 0 | |
| NB | 5 | | 6 | |
| Nova Scotia | 13 | | 9 | |
| ATLANTIC | 26 | 1079000 | 28 | 1162000 |
| QUEBEC | 15 | 622500 | 15 | 622500 |
| ONTARIO | 10 | 415000 | 10 | 415000 |
| Manitoba | 14 | | 14 | |
| Saskatchewan | 10 | | 11 | |
| Alberta (RHAP) | 10 | | 10 | |
| PRAIRIE | 34 | 1411000 | 35 | 1452500 |
| B.C. | 10 | | 5 | |
| Yukon | 5 | | 5 | |
| B.C. REGION | 15 | 622500 | 10 | 415000 |
| **CANADA** | **100** | **4150000** | **98** | **4067000** |

Allocations were subsequently altered because of the finding of the B.C. Region that it would not be able to make use of the full initial allocation. The five extra units were allocated to the Atlantic (4) and Prairie Regions (1), but one planned additional project (in Sydney) was subsequently cancelled. The net result is that 98 units will be constructed under the 1987 allocation. The Alberta allocation follows the pattern established in the 1986 Program of dedicating CMHC funds to the production of units under Alberta's RHAP Program. 1987 funding was provided for ten units, but costs this year are being shared on a 75/25 basis, unlike 1986 when they were cost-shared on

a 50/50 basis. The 1987 allocations have resulted in the projects listed in the table below:

**Table 2: 1987 Demonstration Projects**

| Project Name | Location | CMHC Local Office | Units | Comments |
|---|---|---|---|---|
| Labrador - Coastal | Labrador | St. John's | 9 | Coastal and Sheshatshit |
| Labrador - Sheshatshit | Labrador | St. John's | 4 | are formally one project |
| Sheet Harbour | Nova Scotia | Halifax | 1 | Not started in Feb. |
| Sydney | Nova Scotia | Sydney | (1) | Cancelled |
| Preston | Nova Scotia | Halifax | 8 | |
| New Brunswick | New Brunswick | Fredericton | 6 | |
| Latuque | Quebec | Laval | 5 | |
| Letang | Quebec | Val d'Or | 5 | |
| Quyon | Quebec | Hull | 5 | |
| Caramat | Ontario | Thunder Bay | 2 | |
| Chetwynd | Ontario | North Bay | 3 | |
| Silverwater | Ontario | Sudbury | 5 | |
| Parklands | Manitoba | Winnipeg | 7 | |
| Baden | Manitoba | Winnipeg | 3 | |
| Matheson Island | Manitoba | Winnipeg | 4 | |
| Descharme Lake | Saskatchewan | Saskatoon | 5 | |
| Garson Lake | Saskatchewan | Saskatoon | 6 | |
| Mesilinka | B.C. | Prince George | 5 | |
| Old Crow | Yukon | Whitehorse | 5 | |
| Fishing Lake | Alberta | NA | 2 | under Alberta RHAP |
| Kikino | Alberat | NA | 3 | same |
| Garden River | Alberta | NA | 4 | same - not visited |
| Paddle Prairie | Alberta | NA | 1 | same - not visited |
| | | Total | 98 | |

## 4.2 Staffing And Roles

The Operational Guidelines outlined the responsibilities of the various participants in the process. Broadly speaking, the allocation of responsibilities was expected to conform to the pattern outlined in Table 3.

As in 1986, the delivery of most projects followed the pattern outlined in the Operational Guidelines: CMHC project officers in Local Offices took the lead in hiring construction managers, obtaining designs, hiring subcontractors and tendering materials packages while construction managers provided on-site leadership. There were, however, several variations with respect to the delivery pattern established in 1986.

Regional offices tended to have a less active role in the field this year than in 1986, especially so the Prairie Region which played a very active on-site role in 1986. Their role in the 1987 Program was thus more as anticipated in the Guidelines, one of support to Local offices. On the other hand, CMHC Branch and Local offices tended to provide more leadership in the community and client selection process this year.

In both years, Native associations were generally invited by CMHC to take part in the selection of communities, projects and clients, although in Ontario and Saskatchewan, involvement was mainly by municipal or local councils. In Manitoba, however, the Manitoba Metis Federation (MMF) was less active this year, partially because the MMF felt that the relatively large Demo houses raise local expectations to levels that cannot be sustained by MMF with their own housing and partially because CMHC was also less keen about MMF's involvement in the light of client selection problems experienced in 1986. The MMF did propose to select Churchill this year, but this community did not satisfy the selection criteria.

**Table 3. Intended Delivery Roles**

| TASK | Region | Branch | NGO | C.M. | Client |
|---|---|---|---|---|---|
| Macro program management | L | | | | |
| Local program management | | L | | | |
| Regional/LO budgets | L | | | | |
| Project budgets | A | L | | | |
| Public/NGO relations | S | L | | | |
| Macro project alloc. | L | | | | |
| Project selection | A | L | S | | |
| Client selection | | S/L | L/S | | |
| Selection of CM | | L | S | | |
| Project administration | A | L | | S | |
| Site selection/pre-dev. | A | L | | | |
| Construction management | | A | | L | |
| House design | | L | | S | S |
| Tendering | | L | | | |
| Construction training | | | | L | |
| Construction | | | | A | L |
| House inspections | | L | | S | |

NGO = Non-governmental organization, such as a Native association or a non-profit community association

L = Lead Role, S = Support, A = Approval

### The Role of Local Office (LO) Staff

The involvement of LO staff in the projects varied considerably, but in all cases CMHC staff appear to welcome the opportunity to get their teeth into a program that gives them direct contact with real construction projects.

The ability of CM's to take on the responsibilities foreseen in their contracts was important in determining the role of LO staff. CM's were to provide on-site training, supervision and coordination, while LO staff were to be responsible for tendering, arrangement of subtrade contracts, payments and other administrative functions.

In some projects, such as Labrador, Parklands, Baden, Garson Lake and Descharme Lake, problems with the availability and/or performance of CM's led CMHC staff to carry out part or most of the on-site coordination of materials delivery and supervision of subcontractors. In these projects, therefore, CM's acted more as lead hands than true construction managers.

The organization of the Chetwynd project in Ontario was in contrast to this, with the Project Officer playing a very low-key role, while the CM took almost complete charge of the project. The trust shown by the Local Office in this CM was largely the result of the CM's extensive past experience with another CMHC program, the Residential Rehabilitation Assistance Program (RRAP).

Another example of a CM taking the lead was the Yukon project, where, as in 1986, an architect played the role of CM and took almost complete charge of the project, including unit design and hiring of subtrades. Even here, the Local Office was more active than last year, largely supplanting the active role of the Yukon Housing Corporation in the 1986 client selection process.

Inspection of Demo units varied from the conventional to arrangements where the CMHC staff acted as construction advisor/managers in addition to carrying out inspections, as in the Preston, Manitoba and Saskatchewan projects. Results were mixed, since such situations lead to a built-in conflict between the two roles. Manitoba Local Office inspectors expressed some doubt as to their usefulness or effectiveness in such a mixed role.

In a project where a CMHC inspector performs as CM, he has to act as a leader and advisor (in his role as CM) as well as an inspector. This is a difficult combination of functions to carry out successfully, since the close relationship built up in one role may work against the detachment required to carry out inspection duties. The need for a separation in these roles, in the context of the small and simple projects of the Demo Program, is less than is normally would be the case, but the situation is one that should be monitored.

One reason for the use of a CMHC staff as CM was the desire to save project funds in expensive areas, by funding the CM out of normal Local Office operating funds; another is the difficulty of finding outside candidates who were qualified and available. While the use of a CMHC CM is an inevitable response to such situations, it is illogical as an economy measure, since the costs are still attributable to the project even if not part of the formal accounts. Staff in Saskatchewan and Manitoba offices also expressed the view that the extensive time required by the Demo projects limited their involvement in regular RNH operations.

Notwithstanding these specific observations, staff contact with direct construction through the Demo Program is unique, and is invaluable for morale purposes and for staff performance in the long run.

**The Role of Construction Managers**

As the previous section indicates, the role of CM's varied from being very much in charge, to that of a relatively minor on-site coordinator. A more unusual variation was in the Labrador projects, where CM's undertook subtrade roles in addition to their regular duties. The heavy work load created a problem in the three coastal communities, where the CM had responsibility for nine units in three isolated communities. The Sheshatshit CM carried out the same multiple function with more success in a project of four units. The practice does not appear to be a problem, as long as the projects are small enough to also allow the CM to carry out his normal duties.

The presence of an on-site CM becomes more crucial for projects that are located in very remote areas. Where CMHC has to be actively involved in such projects, the result is likely to be an inefficient use of resources. The Saskatoon LO staff, for example, spent 2/3 of their project time on travelling to their remote projects, not an efficient use of resources.

In all projects, the 1987 experience mirrors that of 1986 in underlining the importance of CM's to the success of projects, especially in their functions as trainers and motivators of the clients. While all CM's appeared to have extensive construction skills, some were not skilled as trainers or motivators and a few seemed to be unaware of the importance of these functions. In such cases, CM's saw their function more as that of a general contractor who was also coordinating the use of free labour, and this attitude had a detrimental effect on the participation levels and skill development of clients and volunteers in such projects. LO's in Manitoba and Saskatchewan found it difficult to find CM's with the requisite skills and attitudes, and their projects suffered as a result.

The fostering of the training and motivating roles of CM's is something that can be encouraged by Local Offices (see 4.5, Training and Information Dissemination). The ability of CM's to use such skills, however, will be limited if they are hard pressed to carry out their basic coordination duties, as may occur in projects that are large and/or scattered. At the other end of the spectrum, it is difficult for CM's to take the process seriously if a project consists of only a single house. These considerations underline the desirability of the program guideline requirement for projects that are concentrated and that consist of 3 to 7 units.

Another factor that can limit the effectiveness of CM's is their availability for the full construction period. In some projects this year (Labrador and Caramat, for example), CM's were hired for periods that did not cover the full term of the construction process, with many contracts expiring in January or February and some as early as December. This was done on purpose in Matheson Island, because of the clients familiarity with construction, but for budgetary reasons in other projects.

No matter what the cause, the effects of CM's leaving projects before the end of construction or being replaced during the process were likely to be negative. Unskilled clients were left on their own at various stages at the process, especially those towards the end, such as drywalling, interior and exterior painting, grading and landscaping. Although the ultimate effects could not be pinpointed at the time of the site visits (end of January to mid-February), there was likely to be a noticeable, although not serious, impact on the quality of work.

The elimination of such situations cannot be assured, since changes in CM's during the life of a project will always be a possibility. The length of contract given to CM's is a variable that can be controlled, however. Short contracts were presumably entered into to limit expenses, but an analysis of project costs shown in Table 4 (see also Appendix 2, page 5) shows that total per-unit expenditures for CM's reached an average of only $2597, well below the guideline recommended $5000. The largest expenditure was $4800 for a CM in Caramat (Ontario), and he did much of the work carried out by subtrades in other projects. It appears, therefore, that expenses for CM's are quite modest, and that the length of contracts could be extended where this would be helpful in improving the quality of work.

**Table 4 Selected Data on Construction Manager Expenditures**

| Project Name | CM Fees + Exp. per house | As % of Total Cost | No. of units in Project |
|---|---|---|---|
| Labrador - Coastal | 4425 | 11.9 | 9 |
| Labrador - Sheshatshit | 3800 | 11.1 | 4 |
| Preston | 0 | 0.0 | 8 |
| Sheet Harbour | NA | | |
| Sydney | NA | | |
| New Brunswick | 2889 | 7.4 | 6 |
| Latuque | 3005 | 7.9 | 5 |
| Letang | 2911 | 5.8 | 5 |
| Quyon | 3500 | 8.6 | 5 |
| Caramat | 4800 | 11.5 | 2 |
| Chetwynd | 667 | 1.7 | 3 |
| Silverwater | 2000 | 5.0 | 5 |
| Parklands | 1749 | 5.4 | 7 |
| Baden | 2290 | 7.2 | 3 |
| Matheson Island | 407 | 1.0 | 4 |
| Descharme Lake | 2800 | 6.8 | 5 |
| Garson Lake | 2333 | 5.6 | 6 |
| Meslinka | 3429 | 8.3 | 5 |
| Old Crow | 3800 | 6.9 | 5 |
| **Average, all units** | **2597** | **6.5** | **5.1** |

Note: Alberta not included; RHAP Program provides construction managers who are paid for out of ongoing Program funds

## 4.3 Community and Project Selection

The Operating Guidelines clearly define the type of communities and projects to be selected. Some of the most important criteria are:

*a) Communities should be off-reserve, and remote or isolated, with populations of less than 2,500.*

*b) Preference should be given to communities where existing RNH Homeownership or rental programs are not being delivered.*

*c) Attempts should be made to locate projects away from urban communities with an existing housing market.*

*d) A typical project shall be considered to consist of a cluster of three to seven units in one community.*

The degree of conformance of communities to the three community selection criteria can be assessed in Table 5 below:

**Table 5 Community Selection Criteria Satisfied**

| | remote, < 2500 pop. | No existing RNH units | No market | 3 to 7 units in one community |
|---|---|---|---|---|
| Lab. Coastal | OK | OK | OK | 2 units in 1 comm. |
| Sheshatshit | OK | OK | OK | OK |
| Preston | rural | RNH in area | market | OK |
| Sheet Harbour | NA | NA | NA | 1 unit |
| Sydney | cancelled | NA | NA | NA |
| New Brunswick | rural | RNH in area | market | 6 units scattered |
| Quyon | rural | OK | market | OK |
| Letang | OK | OK | OK | 5 units, 2 comm. |
| Latuque | rural | OK | OK | 1 unit in 1 comm |
| Silverwater | rural | OK | OK | OK |
| Caramat | rural | RNH in area | OK | 2 units |
| Chetwynd | rural | | OK | OK |
| Parklands | OK | OK | OK | OK |
| Baden | OK | OK | OK | OK |
| Matheson Island | OK | OK | OK | OK |
| Garson Lake | OK | OK | OK | OK |
| Descharme Lake | OK | OK | OK | OK |
| Mesilinka | OK | OK | OK | OK |
| Old Crow | OK | OK | OK | OK |
| Fishing Lake | rural | OK | OK | 2 units |
| Kikino | rural | OK | OK | OK |
| Garden River | OK | OK | OK | OK |
| Paddle Prairie | OK | OK | OK | 1 unit |

**Small and Remote Communities**

Although most of these criteria have been respected in most areas, Table 5 shows significant exceptions. Analysis indicates that rural, rather than remote, communities were often selected in some provinces, especially in the Maritimes. This is the consequence of the organizational and political difficulty of resisting pressures for all regions to benefit from a new program, which has been seen before in other Federal and provincial programs. In the context of a program which is for demonstration purposes, the selection of rural communities is not a serious deviation and may provide useful data on the likely success of applying the self-build concept more widely, in areas that are now served by the RNH Program.

**Non-RNH Communities**

Of the three selection criteria, the most difficult to satisfy appears to be the Program guideline that requires the Demonstration project designation process to avoid communities that already have RNH units. The reason for avoiding the placement of Demo units in areas that also have regular RNH units is presumably based on a desire to avoid local comparisons being made between the two programs, which have (on the surface at least) differences in apparent benefits.

Many Local Offices found that it was difficult, and sometimes impossible, to find small and remote communities where the RNH program had not been applied. There are reportedly no easily accessible non-RNH communities left in Manitoba or Saskatchewan and this year's Saskatchewan communities are of marginal viability. There are indications that the Province of Saskatchewan is not too enthused about CMHC's investments in such communities, which puts pressure on the Province to provide more services.

There are several indicators of the marginal suitability of the Saskatchewan project sites: neither has any community infrastructure to speak of and a large proportion of the population of both communities was absent during the two summer months, resulting in a delay in selecting clients and starting these projects. Client interest in the program was low in both of the Saskatchewan communities as well as in the Baden and Parklands projects in Manitoba.

Quebec illustrates the issue in another sense. There is no RNH program in Quebec, and the selection of Demo project communities could therefore proceed without consideration of the guideline criterion. The fact that there appears to be no lack of eligible communities in Quebec appears to reinforce the legitimacy of the problem in other areas.

There are some projects, including Preston and New Brunswick, where the separation of Demo and RNH houses was not possible to maintain and such units are therefore located in proximity to each other. Preston and New Brunswick, which both received funding also in 1986, have reportedly had no negative reaction. It may be that the apprehension was misplaced, since it is actually very difficult to compare the net benefits of the two programs - the RNH occupant pays a mortgage or rent, but the

Demo client has invested a considerable amount of sweat equity. The situation is far from clear and it is a subject that should be explored in depth in the forthcoming evaluation. If there is justification for dropping the guideline criterion, it will be far easier to find new communities for the Program in the future.

**Choosing Communities With No Housing Market**

The guidelines express a preference for communities that have no active housing market, so that the Demo program will not be seen as competitive. Three 1987 projects are located in areas that appear to have active markets. No negative effects have so far been observed.

**Project Size and Concentration**

The validity of the guideline recommendation for a project size of 3-7 units in one community has been reinforced in this year's program.

The Caramat project and one of the Labrador community sites have two units, while the Sheet Harbour, Sydney[3] and Paddle Prairie projects consist of just one house. The New Brunswick project consisted, as in 1986, of houses scattered over the Province. The main reason for the selection of small projects appears to be the difficulty of finding a sufficient number eligible clients and suitable lots. There is also a natural desire on the part of program administrators to spread the benefits of a program widely, even if some areas are not exactly suited to the program objectives[4], and this tends to result in many small projects.

The smallness of such projects make it difficult to achieve economies of scale in the use of a construction manager or in the purchase of materials. Small projects also increase the difficulty of achieving team work and of generating volunteers and, as previously pointed out, a one- or two-unit project makes it difficult for a CM to take his training and motivational functions seriously. The inclusion of excessively small or excessively scattered projects constitutes the most serious deviation from the intent of the Program.

The Labrador coastal communities, Preston and Parklands are all examples of projects suffering because the time and energy of construction managers and CMHC project managers was being pushed to the limit by projects that were large or scattered. In both Labrador and Parklands, the CM's and project officers had to spread their efforts between three communities, while the Preston CM (a CMHC Inspector) had to cover eight units while carrying out some of his normal inspection duties.

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3 The Sydney project has subsequently been cancelled.

4 This explains the selection of P.E.I. for the 1986 Demo Program

New Brunswick is the one example of a project where scattering does not seem to have had an adverse effect, perhaps because of the excellent roads in the area.

**The Search for Eligible Communities**

The difficulty of finding eligible communities has led to some communities receiving Demo funding in both 1986 and 1987, including Baden, Red Deer and Old Crow[5]. Such a distribution pattern is undesirable because of the change from 5 to 25 year forgiveness from 1986 to 1987, which creates two groups in the same communities who have received a substantially different level of benefit. The issue is not likely to create problems in 1987, however, since building lots in Baden and Red Deer are on Crown Land to which the 25-year provision does not apply; and in Old Crow there is very strong support for the program which is likely to counteract any negative reaction.

Another negative effect of multi-year designation, at least in the Baden and Red Deer context, is the bad feeling created in other nearby communities that have received no Demo units at all. These issues must be dealt with, since there it will be even more difficult to find "virgin" communities in the 1988 selection process.

Regardless of the degree of conformance of Demo projects to the official requirements, it should be noted that there are other community characteristics that are not part of the formal selection criteria but which are turning out to be important, including the viability of the community and the level of organization, leadership, initiative and enthusiasm.

The search for communities that are viable as well as eligible is likely to present an even larger problem next year. As the search continues and the word spreads about the benefits of the program, unwarranted expectations are inevitable - this has, in fact already occurred in Labrador and in Manitoba this year. Clearly, it is desirable to investigate the eligibility of a community and its clients with as little publicity as possible until a decision is made.

There is no easy answer, but some new approaches might ease the problem. The Demo program could be merged with the RNH Program, which would then offer a range of housing solutions to suit a variety of needs. Another way of making a number of additional communities more attractive as Demo sites would be to extend the permitted time span for projects by several months, which would permit materials to be brought in by winter roads, thereby reducing the need to airlift materials.

## 4.4 Clients

**Selection Criteria**

Client selection criteria, which were outlined in the Operational Guidelines, are presented in an abridged form below.

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5 Preston also received funding in both years, but it is a special case, since it was given an initial two-year commitment.

a) *Applicants must have an observable need for improved housing.*

b) *Household income must fall within local or regional definition of core need.*

c) *Applicants must have the ability to operate and maintain their homes and to pay for all utilities and taxes, etc.*

d) *Applicants must demonstrate their willingness and capability to participate in construction through the provision of labour.*

e) *Preference shall be given to those not currently occupying subsidized housing and not currently in housing arrears with any housing authority.*

Other requirements were mainly of an administrative character, including the performance of a credit check, and signature of a Homeowner agreement.

**Incomes and Housing Conditions**

As in 1986, criteria a, b and e were adhered to in virtually all cases[6]. The average of all annual household incomes reported[7] was $12,863, while average households consisted of 2.2 adults and 2.2 children. There were 12 households led by a single adult and 18 with more than two adults. Previous housing conditions reported included very few instances of affordability problems, but many cases of a combination of other problems, including crowding, health and structural problems. No clients were currently living in subsidized housing.

**Table 6: Selected Client Household Characteristics**

| | |
|---|---|
| lowest income | 4800 |
| highest income | 26000 |
| average income | 12863 |
| no. in sample | 75 |
| no. of households with one adult | 12 |
| average no. adults in households | 2.2 |
| no. in sample | 79 |
| average no. of children in households | 2.2 |
| no. in sample | 79 |

**Ability to Operate and Maintain Homes**

It is difficult to ascertain whether clients are likely to have the ability to operate and maintain their homes, as required in criterion (c). The cash incomes of many client households are very low, but taxes are also low, and fuel costs are moderate in areas where wood is available and wood stoves have been installed. In our view, affordability

6 It is difficult to ensure that household incomes fall within CMHC "core need" thresholds in remote areas, since employment is seasonal and largely self-reported.

7 See Appendix 5

problems are most likely to be experienced in projects such as Preston and Quyon, where taxes are on the increase and where clients have to purchase all their food and energy.

Proper operation and maintenance of homes also requires appropriate attitudes and skills. Some of the Native clients (as in Sheshatshit or parts of Manitoba and Saskatchewan) who come from backgrounds where a house is seen as a temporary shelter, will need to develop an understanding of the concept of a permanent home, if it is expected that they develop an interest in maintenance. Preliminary indications based on the inspection of houses in Sheshatshit were very encouraging.

Another area where clients need help is in understanding the implications of home ownership. The Saskatchewan field work showed that many occupants were somewhat confused about their future obligations; some (who possibly confused the Demo Program with RNH) thought that they would have to pay rent in the future, or that they might be repossessed by CMHC. Labrador interviews also showed that clients did not fully understand the mortgage documents; but then, the CMHC staff or the consultant also found the legal language difficult to follow in the context of the way that the Demonstration program is structured.

The best way of ensuring that clients will operate and maintain their units properly is to provide post-occupancy courses. Although some counselling has been provided on an individual basis, we have no reports of a formal program of courses. It must be recognized that such courses are difficult to provide where clients speak a different language and have different cultural values, but the benefits would be considerable.

**Willingness and Ability to Participate**

Client interviews were used to ascertain whether or not applicants satisfied criterion d, willingness and skills, but this is difficult to assess, since project officers have no objective methods of doing so. This makes it difficult to turn down an applicant who may make unwarranted claims of skills and time availability in order to enter the program.

In many cases, the consideration of what communities are eligible is greatly affected by the search for eligible clients. In some cases, the whole selection process was focussed on finding eligible clients, with their place of residence playing a secondary role. Examples of this approach include the Sheet Harbour and Sydney projects in Nova Scotia.

**Actual Client and Community Participation**

Participation by clients in the Demonstration program in the building of their houses was relatively good, with a few exceptions. In the Labrador Coastal and Preston projects, relatively low labour participation rates of clients (estimated at 35% and 25%; see 4.10, *Construction Process*) were largely compensated for by high volunteer turnouts. Client participation was low, however, in all Saskatchewan and Manitoba

projects except for Matheson Island; and in Baden and Red Deer Lake, the 1986 Demo clients did not volunteer to help the 1987 clients.

The Program does not have a mechanism to deal with non-performing clients. One enterprising CM in Labrador threatened to fire a client who was not working on the project, but the fact that the client believed him should not mask the fact that it was an empty threat. The CM's for Garson Lake, Descharme Lake and Red Deer Lake have expressed their unwillingness to do the job again given the same low level of participation. All these cases indicate that the counselling and interviews that occurred before the project started were probably insufficient.

The degree of client and community participation contributed directly to the success of projects. The outcome of the Matheson Island and the Parklands and Baden projects, administered by the Winnipeg Local office, demonstrates this clearly. In Matheson Island the level of participation was excellent, the clients were well equipped to undertake the project and some clients contributed their own building materials and required little outside help to build their units. In the Parklands and Baden project, the level of client and community participation was poor, leading to a need for much outside intervention. These conditions resulted in substantially higher CM and CMHC staff costs in the Parklands and Baden projects; some $3800 per house, as compared to about $2600 per house in Matheson Island. The final outcome is that, within similar budget constraints, the Matheson Island houses provide their owners with more space and indoor plumbing, while the Parklands and Baden units are smaller and lack indoor plumbing.

It is clear that a method of building in an incentive for participation is desirable. The approach used in Silverwater, where free food and drinks were offered to all volunteers turning out for a "building bee", appears to be a very good way of encouraging volunteer participation. Since volunteers cannot be expected to turn out on a continuous basis, one or several building bees, arranged to occur at critical stages of construction, may be a good way of harnessing volunteer energy in the most effective way possible.

## 4.5 Training And Information Dissemination

The information and training provided to clients varied across the country, both in the type of involvement and in its intensity.

### Program Information

One frequent type of information transfer consisted of one or more general sessions to describe the basic elements of the Program, with particular reference to the obligations and responsibilities of homeowners. In some cases, sessions involved a group of potentially eligible clients and took place during the spring and summer, even before the Program had been authorized; but in most cases, the tight schedule after project commitment left time for only one quick session with the clients who were actually selected. Some of these sessions were organized for groups of clients, but many

consisted of visits to individual clients which would also permit an assessment of existing housing conditions.

**Training of Construction Managers**

As in 1986, the performance of the CM's selected was somewhat uneven and the need for CM's who are technically competent and skilled in leading and motivating clients was confirmed. Some difficulty was experienced by Local Offices in Manitoba, Saskatchewan and Labrador in finding qualified Construction Managers. It was never CMHC's intention to train CM's, but is clear that such a step is desirable. The program cannot burden itself with an extensive and expensive training program, but considerable benefit could be obtained by a short familiarization process.

Construction managers could, for example, be assembled within each region for a two-day session. Such sessions should include program orientation (objectives & delivery style) as well as sessions on techniques of training and motivating clients and on vital technical issues such as ventilation and air sealing.

Successful CM's from previous years could provide an overview of the duties to be expected and, more important, could provide a feel for what kinds of issues and problems may arise. In addition, CM's could be led through a few sample Demo houses by an experienced inspector to be alerted to the quality issues that may arise.

It will be hard for CM's to take training seriously if the projects they are asked to manage consist of only one or two houses. We suggest, therefore, that the importance of embarking on projects that conform to the Program Guidelines with respect to size and concentration should again be pointed out to Local Offices.

**Client Skills and Training**

A high level of construction skills is not a prerequisite of participation in the Demonstration Program. During the field work, an attempt was made to establish the approximate level of construction skills possessed by the clients. In order to increase the reliability of these data, estimates were obtained from the construction managers as well as clients. The data, presented in Table 7 (see also Appendix 5) indicate a consistency in estimates between the two sources and show a consensus that an increase in skills has occurred.

As in 1986, the construction training given to clients consisted mainly of on-site and hands-on training to groups and individuals, not formal off-site training. There were also a few cases of training for groups of clients. Table 8 provides an overview of the kind of training provided in each project, as ranked by field surveyors during interviews with project staff.

The amount of training provided is somewhat dependent on the skill of the clients (highly skilled clients usually don't feel they need it) and on the degree of time pressure; but the largest factor is the willingness, ability and availability of the CM to undertake this task. The reactions of clients indicate that the amount of training actually provided by CM's in 1987 may have been less than required.

**Table 7: Skill Levels of Clients**

| Skill Category | Number of Clients in Each Skill Category | | | |
|---|---|---|---|---|
| | As Reported by CM's | | As Reported by Clients | |
| | Initial | Final | Initial | Final |
| 1 (few skills) | 12 | 0 | 16 | 2 |
| 2 (some skills) | 22 | 2 | 19 | 10 |
| 3 (moderate skills) | 19 | 35 | 8 | 18 |
| 4 (skilled) | 7 | 32 | 4 | 12 |
| 5 (professional) | 2 | 6 | 4 | 4 |
| Total | 62 | 75 | 51 | 46 |
| Average, all resp. | 2.4 | 3.7 | 2.0 | 3.1 |
| Increase in Avg. | | 1.2 | | 1.1 |

**Table 8: Type of Training Provided to Demo Clients**

| Project Name | Type of Training | | |
|---|---|---|---|
| | Formal groups | On-site, groups | On-site, individ. |
| Labrador - Coastal | 1 | 1 | 2 |
| Labrador - Sheshatshit | 1 | 4 | 4 |
| Preston | 1 | 1 | 3 |
| New Brunswick | 1 | 1 | 4 |
| Latuque | 3 | 4 | 1 |
| Letang | 1 | 4 | 4 |
| Quyon | 1 | 4 | 4 |
| Caramat | 2 | 2 | 4 |
| Chetwynd | 1 | 1 | 1 |
| Silverwater | 1 | 2 | 4 |
| Parklands | 1 | 5 | 1 |
| Baden | 1 | 4 | 1 |
| Matheson Island | 1 | 1 | 1 |
| Descharme Lake | 1 | 4 | 1 |
| Garson Lake | 1 | 4 | 1 |
| Mesilinka | 1 | 3 | 3 |
| Old Crow | 1 | 1 | 3 |

Values were assigned by field surveyors on a 1 to 5 scale, with 1 = little, 5 = much

Table 9 provides a summary of clients' views on what factors were responsible for improvements in their construction skills. In providing rankings for the influence of CM's, other clients or volunteers, or their own work experience, clients gave more weight to their own experience, rather than efforts of the CM's to train them.

**Table 9: Attribution of Client Increase in Skills**

| | Increase in Skills Attributed to: (No. of Clients Reporting) | | |
|---|---|---|---|
| | Construction Manager | Other clients | Client's own experience |
| 1 (little) | 15 | 23 | 0 |
| 2 | 3 | 9 | 1 |
| 3 | 8 | 5 | 16 |
| 4 | 27 | 18 | 38 |
| 5 (much) | 6 | 0 | 4 |
| Total | 59 | 55 | 59 |
| Average, all resp. | 3.1 | 2.3 | 3.8 |

Values were assigned by clients on a 1 to 5 scale, with 1 = little, 5 = much

The importance of leadership and training by CM's is underlined by the field surveyors' observations that the projects with problems in construction quality tended to be those where CM's had been unable to provide a continuous presence or adequate training. Walls out of plumb, the building of stud walls without checking that floor slabs were level, the erection of siding in the improper sequence and the mistaken use of ordinary wood in PWF construction, are all examples of a lack of basic construction knowledge that should have been avoided if a minimum of training had been provided by construction managers.

## 4.6 Land and Services

### Land

The acquisition of land has been problematic and has caused considerable delays in several projects, despite the much earlier approvals this year. Specific causes include the time required to acquire clear title, to sever lots from farmlands, and to obtain use of crown land. Such activities are not only time-consuming but expensive, since considerable legal work is involved.

Several offices have, however, reduced the financial burden that the purchase of land by trying to limit clients to those who have their own land. The effect of this can be seen in the Table 10 (See also Appendix 2) in the relatively low project expenditures for Land in some projects. Even though eight projects had access to Crown Land (at very low or no costs), the average value or cost of land per house in all projects was $2124, while only $1090 of final project funds was expended for this purpose. In other words, clients contributed an average of $1034 in land value to all projects; far more if Crown Land projects are excluded.

It is clear that the strategy of bringing in clients who have land is effective in reducing the burden on project funds. The effect on clients is not clear. One could argue

that this measure excludes people who are too poor to own land; the other side of the coin is that it adds to the vested interest of the client in maintaining the house in the future. In addition, if less of the budget funds are required for land or services, more can be spent on the house. This is a positive feature if all the clients in a project provide land. If only some clients provide land, however, inequities are created, since project funds are spread more-or-less evenly among clients, and mortgages amounts are the same for all clients. The situation underlines the desirability of separating land and service costs from the rest of the project budget.

**Table 10: Land Expenditures Per House**

| Project Name | Final Project Exp. for Land | Non-Project Land Value | Difference |
|---|---|---|---|
| Labrador - Coastal | 516 | 516 | 0 |
| Labrador - Sheshatshit | 516 | 516 | 0 |
| Preston | 0 | 5000 | 5000 |
| New Brunswick | 2617 | 4283 | 1666 |
| Latuque | 2520 | 2520 | 0 |
| Letang | 7064 | 7064 | 0 |
| Quyon | 3900 | 3900 | 0 |
| Caramat | 0 | 0 | 0 |
| Chetwynd | 0 | 6000 | 6000 |
| Silverwater | 1000 | 1000 | 0 |
| Parklands | 0 | 0 | 0 |
| Baden | 0 | 0 | 0 |
| Matheson Island | 0 | 5000 | 5000 |
| Descharme Lake | 0 | 0 | 0 |
| Garson Lake | 0 | 0 | 0 |
| Mesilinka | 0 | 0 | 0 |
| Old Crow | 0 | 400 | 400 |
| **Average, all units** | **$1090** | **$2124** | **$1034** |

### Services

Many projects are being built without water or sewer services. This is in accordance with the Guidelines, which state that servicing should be to community norms. In some areas, such as Saskatchewan and Manitoba, the lack of services is held to be a community norm. In other projects (for example, Labrador) temporary services have been installed, on the assumption that municipal services will shortly be installed; but CMHC's optimistic view on the timing of services is not fully backed up by local opinion. In any case, the fetching of water in buckets is very inconvenient, and the lack of adequate sewage disposal can be a health hazard. We suggest that composting toilets, which are permitted in the Guidelines, should be more actively considered in future projects.

No electric power is available in the Saskatchewan projects. The CMHC Local Office has taken the view that the selection of such areas is justifiable since it represents a regional or sub-regional norm. On the other hand, it might be argued that the Program would be more effective if it went hand in hand with a program of community services development. Such a viewpoint would be strengthened if the Demo Program were to be made part of the RNH program.

The predominant types of services available in each project are outlined in Table 11 below. It should be noted that there are exceptions in many projects, such as one house having a well and septic tank in a project where others have none.

**Table 11: Services Available in Projects**

| Project Name | Services Predominantly Available | | |
|---|---|---|---|
| | Hydro | Water | Sewage Disposal |
| Labrador - Coastal | yes | temp. buckets | temp. buckets |
| Labrador - Sheshatshit | yes | temp. buckets | temp. buckets |
| Preston | yes | piped | piped |
| New Brunswick | yes | well | septic |
| Latuque | yes | well | septic |
| Letang | yes | piped | piped |
| Quyon | yes | piped | piped |
| Caramat | yes | well | septic |
| Chetwynd | yes | well | septic |
| Silverwater | yes | well | septic |
| Parklands | yes | bucket/well | outhouse/septic |
| Baden | yes | bucket | outhouse |
| Matheson Island | yes | bucket/well | septic |
| Descharme Lake | limited | bucket | outhouse |
| Garson Lake | limited | bucket | outhouse |
| Mesilinka | no | bucket | septic |
| Old Crow | yes | holding tank | holding tank |
| Fishing Lake | yes | cisterns | septic |
| Kikino | yes | cisterns | septic |
| Garden River | not visited | | |
| Paddle Prairie | not visited | | |

## 4.7 House Designs

House designs show considerable variety in configuration, as indicated in Table 12. The most common type is a single floor unit over a crawl space. A variant is a single floor unit over a basement. A bilevel design (with entry at the split level) is popular in the Preston area, while a few true split-level units are scattered throughout the country.

One two-storey unit was built. Many unit types are based on conventional RNH or locally-accepted designs. The Mesilinka clients designed their own, while Yukon clients had, as in 1986, the benefit of individual designs prepared by an architect.

## Table 12: Selected House Type Characteristics

| Project Name | Name | Floors | Bas/Crawl type | Gr.Floor area sq.ft. | Equivalent area sq.ft. |
|---|---|---|---|---|---|
| Labrador/Coastal | Nain/Davis | 1 | crawl | 912 | 912 |
| Labrador/Sheshatshit | Nain/Davis | 1 | crawl | 912 | 912 |
| Preston | RNH bilevel | 1 | basement | 767 | 1331 |
| | RNH bungalow | 1 | basement | 931 | 1397 |
| New Brunswick | 2 bdr.bungalow | 1 | crawl | 850 | 850 |
| | 3 bdr.bungalow | 1 | crawl | 942 | 942 |
| | 3 bdr. 2-storey | 2 | basement | 1207 | 1543 |
| Latuque | 2 bdr. bungalow | 1 | basement | 912 | 1368 |
| | 3 bdr. bungalow | 1 | basement | 912 | 1368 |
| Letang | 3 bdr. bungalow | 1 | basement | 988 | 1482 |
| Quyon | 3 bdr. bungalow | 1 | basement | 988 | 1482 |
| Caramat | RNH H-1 3 bdr. | 1 | crawl | 1119 | 1119 |
| | RNH H-1 5 bdr. | 1 | crawl | 1336 | 1336 |
| Chetwynd | 3 bdr. split | 1 1/2 | bas/crawl | 1056 | 1587 |
| Silverwater | Beaver Lumber | 1 | crawl | 1092 | 1365 |
| Parklands | 86 Demo 4-bdr. | 1 | open crawl | 1008 | 1008 |
| | 86 Demo 3-bdr. | 1 | open crawl | 864 | 864 |
| | 86 Demo log | 1 | crawl | 864 | 864 |
| | MHRC Senior Cit | 1 | crawl | 576 | 576 |
| Baden | 86 Demo 4-bdr. | 1 | open crawl | 1008 | 1008 |
| | MHRC Senior Cit | 1 | crawl | 576 | 576 |
| Matheson Island | Dueck Bldg Mart | 1 | basement | 1260 | 1890 |
| | 86 Demo 4-bdr. | 1 | crawl | 1008 | 1008 |
| Descharme Lake | 3-bdr. log | 1 | crawl | 960 | 960 |
| Garson Lake | 2 bdr. Add-On | 1 | open crawl | 768 | 768 |
| | 3 bdr. Add-On | 1 | open crawl | 912 | 912 |
| | 5 bdr. Add-On | 1 | open crawl | 1152 | 1152 |
| Mesilinka | 2 bdr. bungalow | 1 | crawl | 768 | 768 |
| | 3 bdr.bungalow | 1 | crawl | 988 | 988 |
| | 4 bdr. bungalow | 1 | crawl | 1040 | 1040 |
| | 4 bdr. bungalow | 1 | crawl | 1072 | 1072 |
| Old Crow | 2 bdr. bungalow | 1 | open crawl | 672 | 744 |
| | 2 bdr. bungalow | 1 | open crawl | 816 | 864 |
| | 2 bdr. bungalow | 1 | open crawl | 816 | 888 |
| **Average, all Demo units** | | | | 950 | 1142 |
| Fishing Lake | RHAP 2 bdr. Nascor | 1 | crawl | 780 | 780 |
| Kikino | RHAP 2 bdr. bungalow | 1 | crawl | 780 | 780 |
| | RHAP 3 bdr. bungalow | 1 | crawl | 936 | 936 |
| Garden River | RHAP 3 bdr. bungalow | 1 | crawl | 936 | 936 |
| | Pickardville 4 bdr. | 1 | open crawl | 1040 | 1040 |
| Paddle Prairie | Seven S 3 bdr. | 1 | open crawl | 936 | 936 |
| **Average, all RHAP units** | | | | 920 | 920 |

Although the program has succeeded in building houses within the cost limits, many are still quite large - the average ground floor gross area of units built under the program is 950 sq. ft., and the equivalent area[8] is 1142 sq.ft. There is also a considerable variation in the house sizes, with equivalent areas ranging from 576 to 1890 sq.ft. This is larger than houses built under the Alberta RHAP program, which range from 780 to 1040 sq. ft. and have a weighted average equivalent area of 920 sq. ft.

While not luxurious, the size of typical Demo units is generous compared to current existing accommodation in these areas. The effect, according to the Manitoba Metis Federation, is that the considerably smaller units they have traditionally produced in areas such as Baden are no longer acceptable. The issue of unit sizes was also raised in 1986, when a delivery agency in Annapolis, Nova Scotia, expressed similar views on the effects of Demo house sizes on its very small houses. Torngat, a Labrador delivery organization also produces very small units in its normal operations, and the same reaction may arise there.

The typical Demo house size of 912 to 988 sq. ft. certainly represents a large increase in accommodation standards for the Demo clients, many of whom have lived in tiny shacks. The reasons for designing and building such units are not clear, but one probable reason is that CMHC staff may wish to stick to standards that they are familiar with -- in this case the well-established standards developed in the CMHC Residential Standards.[9] It is also clear that the Demo budget ceiling of $41,500 per house is sufficient to permit these generous house sizes.

Besides having an effect on the acceptability of smaller units produced by other delivery agencies, large units also cost more to build and require more labour input on the part of clients and volunteers. On the other hand, the Demo units are not large relative to Canadian urban standards, and many Demo clients are members of extended families who tend to have long-term visitors. The environmental conditions of the northern and remote locations of most Demo projects also leads to long periods of indoor activity during winter seasons. Finally, marginal costs for size increases are modest, a case that has been made for the inclusion of basements.

There is no easy answer to the issue of appropriate size of units. One solution is to produce small core houses that are designed from the start to have the potential for future additions. In this way, initial costs can be minimized and the skills learned in the first project will allow the client to subsequently build the addition without supervision.

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8 House areas are usually defined as the gross area of the above-grade floors. This does not take into account the extra living space available in basements, the lower floor of bilevel units, or the storage space available in heated crawl spaces of adequate height. We have therefore developed a measure, equivalent area, to include these areas, prorated for usefulness.
Specifically:
above grade area = 100%
lower floor of bilevel = 75%
basement = 50%
usable crawl space = 25%
unheated vestibules = 50%

9 The Residential Standards are no longer in force, but many provisions live on in CMHC Builders Bulletins

The Veterans houses produced in the late 1940's and early 1950's led the way in this approach.

Another technique would be to develop a series of model house plans of varying sizes, and allow clients to choose a unit size appropriate for them. The problem with this approach is that many clients are not trained to visualize drawings, nor to imagine the effects of a theoretical model on their living patterns. Many CMHC staff may also resist, as professionals, a shrinkage of units to sizes that are below their design norms.

This issue should be the subject of a focussed debate in the near future.

**Structural Characteristics of Demo Units**

Table 13 outlines some of the technical features found in Demo units.

**Basements** continue to be popular in Nova Scotia and Quebec. The rationale is that basements are the community norm in these areas and, in any case, constitute a small marginal cost relative to the benefit of a large amount of extra space. The argument of low marginal cost does not apply, however, to cases where blasting has to be undertaken, as in the Letang project.

In several projects, including those in Nova Scotia, Quebec and Ontario, contractors have been used to build block and poured concrete foundations. The premise is that a good (and level) job here will make it difficult to have a totally unacceptable job. The complete foundation also provides a psychological boost for the clients. The premise appears to be sound.

**Preserved Wood Foundations** were used more extensively in 1987 than in 1986. Most of the clients in the Labrador projects changed from preserved wood to poured footings because of the difficulty of establishing a perfectly level surface for the preserved wood footings. Specific problems were not reported in other projects.

**Truss floor joists** have been used in several projects this year. These are useful in a northern context, since they reduce foundation supports and thereby reduce the effects of differential settlement or ground heave. Field staff noted, however, noticeable springiness in some of these units and considerable deflections have been noted in some 1986 units with open crawl spaces. It may be desirable to oversize such trusses in the future.

**Roof construction** consisted primarily of low heel and high heel trusses, with a few truss joist and rafter units. Fourteen unit types were built with high-heel trusses, which permit full roof insulation to extend to the wall, while thirteen types had low heel trusses.

The standard **wall construction** used in the Program was undoubtedly the 2" x 6" wall with R20 (RSI 3.52) insulation, which was used in 21 of the 33 unit types built. Four unit types had additional strapping and insulation on the interior side of a 2" x 6" wall, while six unit types had exterior insulation.

## Table 13 Selected Structural Characteristics of Demo House Types

| Project Name | Name | Basement/ found. type | Wall struct. | Roof struct. | Floor struct |
|---|---|---|---|---|---|
| Labrador/Coastal | Nain/Davis | pw wall/conc.ftg | 2x6 | hh truss | truss |
| Labrador/Sheshatshit | Nain/Davis | pw wall/conc.ftg | 2x6 | hh truss | truss |
| Preston | RNH bilevel | pc wall/slab | 2x6 panel | lh truss | joists |
| | RNH bungalow | pc wall/slab | 2x6 panel | lh truss | joists |
| New Brunswick | 2 bdr.bungalow | cb wall/pc slab | 2x6 + int.ins. | hh truss | joists |
| | 3 bdr.bungalow | cb wall/pc slab | 2x6 + ext.ins. | hh truss | joists |
| | 3 bdr. 2-storey | cb wall/pc slab | 2x6 + ext.ins. | hh truss | joists |
| Latuque | 2 bdr. bungalow | pc wall/slab | 2x6 | lh truss | joists |
| | 3 bdr. bungalow | pc wall/slab | 2x6 | lh truss | joists |
| Letang | 3 bdr. bungalow | pc wall/slab | 2x6 | lh truss | joists |
| Quyon | 3 bdr. bungalow | pc wall/slab | 2x6 | lh truss | joists |
| Caramat | RNH H-1 3 bdr. | pw wall/pt posts | 2x6 | lh truss | joists |
| | RNH H-1 5 bdr. | pw wall/pt posts | 2x6 | lh truss | joists |
| Chetwynd | 3 bdr. split | cb wall/pc slab | 2x6 | lh truss | joists |
| Silverwater | Beaver Lumber | cb wall/pc ftgs. | 2x6 | lh truss | joists |
| Parklands | 86 Demo 4-bdr. | pt posts/pad ftg | 2x6 | hh truss | truss |
| | 86 Demo 3-bdr. | pt posts/pad ftg | 2x6 | hh truss | truss |
| | 86 Demo log | pw wall | 8" sq.logs | hh truss | truss |
| | MHRC Senior Cit | pw wall | 2x6 | hh truss | truss |
| Baden | 86 Demo 4-bdr. | pw wall | 2x6 | hh truss | truss |
| Matheson Island | Dueck Bldg Mart | pw wall/pc slab | 2x6 + ext.ins | lh truss | joists |
| | 86 Demo 4-bdr. | pw wall/pc ftg | 2x6 | hh truss | truss |
| Descharme Lake | 3-bdr. log | pw wall/pc ftg | 10" rnd.logs | lh truss | joists |
| Garson Lake | 2 bdr. Add-On | pw posts/pads | 2x4 + ext.ins | 2x6 panel | joist pnl |
| | 3 bdr. Add-On | pw posts/pads | 2x4 + ext.ins | 2x6 panel | joist pnl |
| | 5 bdr. Add-On | pw posts/pads | 2x4 + ext.ins | 2x6 panel | joist pnl |
| Mesilinka | 2 bdr. bungalow | pw wall/ftgs | 2x6 | hh truss | joists |
| | 3 bdr. bungalow | pw posts/pads | 2x6 | hh truss | joists |
| | 4 bdr. bungalow | pw posts/pads | 2x6 | hh truss | joists |
| | 4 bdr. bungalow | pw posts/pads | 2x6 | hh truss | joists |
| Old Crow | 2 bdr. bungalow | pw posts/pads | 2x6 + int.2x3 | truss joists | truss |
| | 2 bdr. bungalow | pw posts/pads | 2x6 + int.2x3 | truss joists | truss |
| | 2 bdr. bungalow | pw posts/pads | 2x6 + int.2x3 | truss joists | truss |
| Fishing Lake | RHAP Nascor | pw wall/pc ftg | 2x6 | hh truss | truss |
| Kikino | 2 bdr. bungalow | pw wall/pc ftg | 2x6 | hh truss | truss |
| | 3 bdr. bungalow | pw wall/pc ftg | 2x6 | hh truss | truss |
| Garden River | 3 bdr. bungalow | | | | |
| | Pickardville 4 bdr. | | | | |
| Paddle Prairie | Seven S 3 bdr. | | 4" panels | | |

pw = preserved wood
pc = poured concrete
hh truss = high-heel roof truss
cb = concrete block
pt = pressure treated
lh truss = low-heel or normal roof truss

**Log construction** was used in Descharme Lake and in some of the units of the Parklands project. The performance of these units will greatly depend on the integrity of the sealants used, the joint detailing and the occupancy and maintenance patterns followed by the occupants. CMHC staff are inclined to hold off on building more log houses until the performance of these units has been monitored for at least one season.

**Air-tight building techniques** were used in few projects; in fact there are no reported instances of air-vapour barriers (AVB's) being caulked to modern standards (e.g., caulking at headers, at wall/ceiling joints etc.). Insulation and AVB details at joist headers were also not up to modern energy-efficiency standards in a number of projects. This is in accord, however, with current low-cost speculative building practices, which is the basis of comparison. Sealant would, in any case, have been difficult to install during the winter conditions that prevailed in most projects.

### The "Add-On" System

This year, a complete kit approach was tried in the Garson Lake project, using the system developed by Add-On Building Ltd. of Edmonton. The Add-On system is a kit that contains all above-grade components, including wall, roof and floor panels. The system does not provide full prefabrication, since there is much on-site work to be done once the shell is erected.

In the Garson Lake project, problems were encountered due to the difficulty of access, poor weather conditions, poor communications between the Local Office and Add-On Buildings Ltd., and a lack of manpower building the units. Add-On Buildings Ltd. also expressed the view that the on-site workmen were not sufficiently skilled or hard-working to ensure that a good product would be delivered on time. In retrospect, it was perhaps unrealistic to expect local untrained workers to quickly assemble the materials packages that suddenly arrived, without having been given prior training and familiarization with the system.

One of the premises of the project was that the Add-On project would be about 40% less expensive than stick-built houses, but the Saskatoon Local Office estimates that the project actually cost about 20% more than such units. The rationale of reduced costs is, therefore, still unproven. Add-On officials feel that most of the increase was due to the low productivity of the crew assembling the system, and they have offered to have their own crews erect the basic shell for a cost of $24/sq.ft., as compared to the price of $21/sq.ft. unassembled. This would provide a more definitive test of the system.

The completed project appears to provide good units, except that their airtightness is likely to be poor, since the AVB was installed without sealant. The presence of waferboard on the interior of walls will retard the passage of water vapour, but the concern (at the time of inspection) was at door and window junctions.

### Other Kit and Prefabrication Efforts

There were other projects which involved less comprehensive efforts in the supply of kits and in prefabrication[10]. In the Preston project, walls were delivered in preassembled 4' x 4' or 4' x 8' panels, as they were in 1986. Two units in the Matheson Island project were provided by a local building supplier, as was the case in Silverwater. In both of these cases, the supplier provided designs and packages that had been developed for a broader commercial market. Packages contained all materials, most of them pre-cut, and the designs allowed for choices in finish materials. Such approaches represent a well-established, low-risk and economical solutions, and net construction costs in these two projects were among the lowest across the country.

The Alberta RHAP program has also used kits and prefabrication this year. Such an approach is particularly suitable for Alberta, because of the low proportion of client labour involved in their program. The Fishing Lake project used panelized exterior wall sections and the Paddle Prairie project (which was not visited) consisted of a single unit using a polyurethane sandwich panel manufactured by Seven S Structures Inc. of Grand Prairie. The panels consist of 4" to 6" of polyurethane sandwiched between two sheets of 3/8" oriented strand board.

The case for a kit or prefabrication approach can be made on three main grounds: reduced on-site labour costs, speed of erection, and a higher level of quality, due to preassembly under controlled conditions. Prefabrication also makes sense in areas where it is difficult to find skilled labour, where materials must in any case be shipped in, or where the clients are physically restricted in their ability to do heavy work (usually older clients).

In the context of the free labour provided by clients under the Demo program, the economic argument for a full prefabrication approach does not hold up; and the quality of houses produced by client labour has proven to be quite satisfactory. A case can be made, however, for using prefabrication to speed erection during the compressed building season available in northern communities.

Prefabrication is likely to be unpopular in areas where there is very little employment, since such systems generate less employment than traditional stick-built methods.

### Heating Systems

As Table 14 indicates, Demo houses were designed with a wide variety of heating systems. Many designs (13 of the 33 total design types) were provided with back-

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10 A distinction should be made between kits and prefabrication. We take a kit approach to mean that a significant number, or all, of the components of the house are provided in a materials package and are designed to fit physically and functionally with the plan for which the kit has been developed. We take prefabrication to mean the pre-assembly of some or all sub-components off-site, so that they can quickly and efficiently be assembled on site. Using these definitions, it is clear that a kit can contain prefabricated or pre-assembled sub-components. On the other hand, prefabricated elements could also be used in a variety of ways that have nothing to do with a kit approach as, for example, with factory-produced roof trusses

up heating systems. Eighteen of the 33 rely on wood stoves as a main systems, while electric baseboard heating is widely used in Nova Scotia, New Brunswick and Quebec.

**Table 14: Heating Systems in Demo Units**

| Project Name | Name | Main htg system | Secondary htg. system |
|---|---|---|---|
| Labrador/Coastal | Nain/Davis | wood stove/fan | oil furnace |
| Labrador/Sheshatshit | Nain/Davis | wood stove/fan | el.baseboard |
| Preston | RNH bilevel | el. baseboard | none |
| | RNH bungalow | el. baseboard | none |
| New Brunswick | 2 bdr.bungalow | el.baseboard | none |
| | 3 bdr.bungalow | el.baseboard | none |
| | 3 bdr. 2-storey | el.baseboard | none |
| Latuque | 2 bdr. bungalow | el.baseboard | wood stove |
| | 3 bdr. bungalow | el.baseboard | wood stove |
| Letang | 3 bdr. bungalow | el. baseboard | none |
| Quyon | 3 bdr. bungalow | el. baseboard | none |
| Caramat | RNH H-1 3 bdr. | el. furnace | wood stove |
| | RNH H-1 5 bdr. | el. furnace | wood stove |
| Chetwynd | 3 bdr. split | el.baseboard | wood stove |
| Silverwater | Beaver Lumber | el.baseboard | none |
| Parklands | 86 Demo 4-bdr. | wood stove | el.baseboard |
| | 86 Demo 3-bdr. | wood stove | el.baseboard |
| | 86 Demo log | wood stove | el.baseboard |
| | MHRC Senior Cit | el. furnace | wood stove |
| Baden | 86 Demo 4-bdr. | wood stove | el.baseboard |
| Matheson Island | Dueck Bldg Mart | wood/el. furn | none |
| | 86 Demo 4-bdr. | wood stove | el.baseboard |
| Descharme Lake | 3-bdr. log | wood cookstv | none |
| Garson Lake | 2 bdr. Add-On | wood cookstv | none |
| | 3 bdr. Add-On | wood cookstv | none |
| | 5 bdr. Add-On | wood cookstv | none |
| Mesilinka | 2 bdr. bungalow | wood stove | none |
| | 3 bdr.bungalow | wood stove | none |
| | 4 bdr. bungalow | wood stove | none |
| | 4 bdr. bungalow | wood stove | none |
| Old Crow | 2 bdr. bungalow | wood stove | none |
| | 2 bdr. bungalow | wood stove | none |
| | 2 bdr. bungalow | wood stove | none |
| Fishing Lake | RHAP Nascor | wood stove | none |
| | RHAP Nascor | propane furnace | none |
| Kikino | 2 bdr. bungalow | propane furnace | none |
| | 3 bdr. bungalow | propane furnace | none |
| Garden River | 3 bdr. bungalow | propane furnace | none |
| | Pickardville 4 bdr. | propane furnace | none |
| Paddle Prairie | Seven S 3 bdr. | | |

## Table 15: Ventilation Systems in Demo Units

| Project Name | Name | Ventilation system | House air circulation | Makeup air |
|---|---|---|---|---|
| Labrador/Coastal | Nain/Davis | bth/kit fans | none | none |
| Labrador/Sheshatshit | Nain/Davis | bth/kit fans | none | none |
| Preston | RNH bilevel | bth/kit fans | none | none |
| | RNH bungalow | bth/kit fans | none | none |
| New Brunswick | 2 bdr.bungalow | central exh/dm | none | yes |
| | 3 bdr.bungalow | central exh/dm | none | yes |
| | 3 bdr. 2-storey | central exh/dm | none | yes |
| Latuque | 2 bdr. bungalow | bth/kit fans | none | none |
| | 3 bdr. bungalow | bth/kit fans | none | none |
| Letang | 3 bdr. bungalow | bth/kit fans | none | none |
| Quyon | 3 bdr. bungalow | bth/kit fans | none | none |
| Caramat | RNH H-1 3 bdr. | wired for kit.fan | hot air system | none |
| | RNH H-1 5 bdr. | wired for kit.fan | hot air system | none |
| Chetwynd | 3 bdr. split | bth/kit fans/dm | yes | yes |
| Silverwater | Beaver Lumber | bth/kit fans/dm | none | yes |
| Parklands | 86 Demo 4-bdr. | bth/kit fans/dm | clg. fan | yes |
| | 86 Demo 3-bdr. | bth/kit fans/dm | clg. fan | yes |
| | 86 Demo log | bth/kit fans/dm | clg. fan | yes |
| | MHRC Senior Cit | bth/kit fans/dm | hot air system | yes |
| Baden | 86 Demo 4-bdr. | bth/kit fans/dm | clg. fan | yes |
| Matheson Island | Dueck Bldg Mart | bth/kit fans/dm | hot air system | yes |
| | 86 Demo 4-bdr. | bth/kit fans/dm | none | yes |
| Descharme Lake | 3-bdr. log | none | none | none |
| Garson Lake | 2 bdr. Add-On | none | transoms | none |
| | 3 bdr. Add-On | none | transoms | none |
| | 5 bdr. Add-On | none | transoms | none |
| Meslinka | 2 bdr. bungalow | none | none | none |
| | 3 bdr.bungalow | none | none | none |
| | 4 bdr. bungalow | none | none | none |
| | 4 bdr. bungalow | none | none | none |
| Old Crow | 2 bdr. bungalow | HRV | low partitons | HRV |
| | 2 bdr. bungalow | HRV | low partitons | HRV |
| | 2 bdr. bungalow | HRV | low partitons | HRV |
| Fishing Lake | RHAP Nascor | bth/kit fans | hot air system | |
| Kikino | 2 bdr. bungalow | bth/kit fans | hot air system | |
| | 3 bdr. bungalow | bth/kit fans | hot air system | |
| Garden River | 3 bdr. bungalow | | | |
| | Pickardville 4 bdr. | | | |
| Paddle Prairie | Seven S 3 bdr. | | | |

dm = dehumidistat control
HRV = heat recovery ventilator

**Ventilation and Make-Up Air Systems**

While most project houses have adequate ventilation of attics or crawl spaces, very few contain adequate provision for the ventilation of house spaces, for make-up air systems or for interior air circulation. Details are provided in Table 15.

The 1985 National Building Code requires a mechanical ventilation system which is capable, during heating seasons, of providing 1/2 air change per hour. This does not necessarily require an HRV or a central air exchange unit, but if manually-switched bathroom or kitchen fans are used, there must be a make-up air supply located at the far end of the building. Given that some areas have low grade electricity supplies and that the 1985 NBC does not apply in Labrador, and that this provision has not yet been adopted in Ontario or Manitoba, the fact remains that the lack of adequate house exhaust or make-up air systems is a serious long-term problem. It is unrealistic to expect occupants to keep bathroom or kitchen fans continuously switched on, even if the typically poor installation of air-vapour barriers provides for unplanned make-up air.

Traditional building techniques have resulted in a building envelope leaky enough to ensure the entry of fresh air even in the absence of fans. As air-tight building techniques gradually permeate the building industry, however, the increasing tightness of building envelopes (even in areas where the Demo Program operates), is likely to bring the situation to a head. A unit built with a tight envelope, a wood stove and with no provision for makeup air or an exhaust system that is likely to be actively used, is a recipe for trouble. Trying to maintain the current technique of installing AVB's without fully sealing them is not a viable option either, since the increased amounts of insulation and the presence of concentrated points of leakage (as compared to an even diffusion surface in days before the use of AVB's) will create severe problems of condensation and rotting of the structure.

With specific reference to the 1987 Demo units, internal air circulation is likely to be a problem in those units that are heated with electric baseboards or by wood stoves, since designs in only three projects made provision for anything beyond bathroom door undercuts. The Old Crow project designs feature a relatively open plan and low partitions, designed to promote internal air circulation and heat transfer from the wood stove. Although this is an attractive idea, it should be noted that recent feedback indicates that the clients are not happy with this arrangement.

The most serious issue for 1987 Demo units, however, is the absence of combustion make-up air supply in most designs. This should be remedied during the coming year in those units that have combustion-type heating systems.

**Energy Performance**

The majority of houses have been designed with R20 walls and R32 or R40 roofs. Other elements of the designs, however, are less consistent in their approach to energy performance. Orientation for maximum solar gain does not appear to have been a consideration. Less than half of the units built included a vestibule, which would greatly reduce drafts and heat losses. Glazing ranged form excellent to mediocre -- two

projects used triple glazing, but others featured a variety of double-glazed units, ranging from high-quality thermopane awning or casement units, to leakier double sliding units. A summary of energy features is shown in Table 16.

Only one project (Old Crow) included heat recovery ventilators, and this project received extra funding from the Yukon Housing Corporation. In other cases, the limited budgets prevented the purchase of commercially available HRV's. We suggest that immediate steps should be taken to assess more economical site-built HRV's that have been built and to disseminate the results to Local Offices.

A major impediment to good energy performance is likely to be the methods that were used in installing windows and in applying AVB's. In those projects where this work was still visible, there were no indications of contemporary sealing methods being used. It should be noted, however, that such procedures are not a Code requirement and would have involved extra training and extra costs. The winter conditions under which most projects were built would also have made this a difficult exercise.

The degree of tightness that should be aimed for in the Program is not easy to determine. One could argue that greater efforts should be made to provide really airtight AVB's, through better training and the use of sealants. On the other hand, the time and cost required to provide such training would not be insignificant. One could further argue that leaky AVB's are desirable, since this alleviates the inadequate ventilation and makeup air systems in most of the units. On the whole, however, we are of the opinion that the structural deterioration likely to be caused by defects in AVB's, and the subsequent decrease in unit longevity, is of sufficient concern to require action to improve airtightness.

**1986 Houses**

1986 houses were given a cursory drive-by in Preston and several 1986 units were visited in Sydney, Baden and Red Deer Lake. These units appear to be well maintained, and the owner of some units in Preston and Red Deer Lake had built small additions and sundecks. In New Brunswick, a 1986 client applied for permission to obtain a second mortgage, so that he could build a basement under his unit. The basement was poorly built and does not appear to be very compatible with the original design, indicating that CMHC needs to approach this kind of proposal very carefully and that, if approval is given, some control must be maintained over the additional work. This type of experience could be avoided if the core-house concept were to be applied[11].

Truss joists were first used in the 1986 projects of Baden, Red Deer lake and Long Body Creek. The Regional Architect has reported unusually large deflections in the Baden units and Red Deer Lake, which also have open crawl spaces. The specific cause

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11 See pg. 33

## Table 16: Energy Features in Demo Units

| Project Name | Name | Roof RSI | Wall RSI | Bas.Wall RSI | Floor RSI | Other features |
|---|---|---|---|---|---|---|
| Labrador/Coastal | Nain/Davis | 7.04 | 3.52 | 3.52 | 0 | |
| Labrador/Sheshatshit | Nain/Davis | 7.04 | 3.52 | 3.52 | 0 | |
| Preston | RNH bilevel | 7.04 | 3.52 | 2.11 | 0 | |
| | RNH bungalow | 7.04 | 3.52 | 2.11 | 0 | |
| New Brunswick | 2 bdr.bungalow | 7.04 | 3.10 | 0 | 3.52 | |
| | 3 bdr.bungalow | 7.04 | 4.29 | 1.74 | 0 | |
| | 3 bdr. 2-storey | 7.04 | 4.29 | 1.74 | 0 | |
| Latuque | 2 bdr. bungalow | 5.84 | 3.52 | planned | 0 | |
| | 3 bdr. bungalow | 5.84 | 3.52 | planned | 0 | |
| Letang | 3 bdr. bungalow | 7.04 | 3.52 | 1.30 | 0 | |
| Quyon | 3 bdr. bungalow | 5.64 | 3.52 | 2.11 | 0 | |
| Caramat | RNH H-1 3 bdr. | 7.04 | 3.52 | 1.30 | 0 | |
| | RNH H-1 5 bdr. | 7.04 | 3.52 | 1.30 | 0 | |
| Chetwynd | 3 bdr. split | 5.64 | 3.52 | 2.11 | 0 | |
| Silverwater | Beaver Lumber | 5.64 | 3.52 | NA | | |
| Parklands | 86 Demo 4-bdr. | 7.04 | 3.52 | 3.52 | 0 | |
| | 86 Demo 3-bdr. | 7.04 | 3.52 | NA | 7.04 | |
| | 86 Demo log | 7.04 | 0 + logs | 3.52 | 0 | |
| | MHRC Senior Cit | 7.04 | 3.52 | 3.52 | 0 | |
| Baden | 86 Demo 4-bdr. | 7.04 | 3.52 | 3.52 | 0 | |
| Matheson Island | Dueck Bldg Mart | 7.04 | 4.85 | 4.85 | 0 | trpl.glz |
| | 86 Demo 4-bdr. | 7.04 | 4.85 | 4.85 | 0 | |
| Descharme Lake | 3-bdr. log | 7.04 | 0 + logs | 3.52 | 0 | trpl.glz |
| Garson Lake | 2 bdr. Add-On | 7.04 | 3.44 | NA | 4.90 | trpl.glz |
| | 3 bdr. Add-On | 7.04 | 3.44 | NA | 4.90 | trpl.glz |
| | 5 bdr. Add-On | 7.04 | 3.44 | NA | 4.90 | trpl.glz |
| Mesilinka | 2 bdr. bungalow | 7.04 | 3.52 | 3.52 | 0 | |
| | 3 bdr.bungalow | 7.04 | 3.52 | 3.52 | 0 | |
| | 4 bdr. bungalow | 7.04 | 3.52 | 3.52 | 0 | |
| | 4 bdr. bungalow | 7.04 | 3.52 | 3.52 | 0 | |
| Old Crow | 2 bdr. bungalow | 7.04 | 4.93 | NA | 8.45 | HRV |
| | 2 bdr. bungalow | 7.04 | 4.93 | NA | 8.45 | HRV |
| | 2 bdr. bungalow | 7.04 | 4.93 | NA | 8.45 | HRV |
| Fishing Lake | RHAP Nascor | 7.04 | 3.52 | 3.52 | NA | |
| Kikino | 2 bdr. bungalow | 7.04 | 3.52 | 3.52 | NA | |
| | 3 bdr. bungalow | 7.04 | 3.52 | 3.52 | NA | |
| Garden River | 3 bdr. bungalow | 7.04 | 3.52 | 3.52 | NA | |
| | Pickardville 4 bdr. | 7.04 | 3.52 | 3.52 | NA | |
| Paddle Prairie | Seven S 3 bdr. | 7.04 | 3.52 | 3.52 | NA | |

RSI = thermal resistance, measured in international SI units
trpl.glz. = triple glazing
HRV = heat recovery ventilator

is not clear, but a negative truss-uplift phenomenon is a candidate. This problem is being closely monitored by the Building Inspection Branch of the Province.

## 4.8 Tendering And Materials Delivery

### Tendering

There was considerable variation in the approach used to obtain material prices. Some offices prepared detailed working drawings, specifications and comprehensive bills of materials, while others took a much simpler approach. Specific project approaches are shown in Table 17.

**Table 17: Selected Tendering Information**

| Project | Tender Basis | Tender Call Type | Selection Criteria |
|---|---|---|---|
| Labrador - Coastal | D B | open | price, service |
| Labrador - Sheshatshit | D B | open | price, service |
| Preston | D S | invited | price |
| New Brunswick | B | invited | price |
| Latuque | D B S | invited | price |
| Letang | B | invited | price |
| Quyon | B | invited | service, location |
| Caramat | D | invited | price |
| Chetwynd | NA | LO shopping | price |
| Silverwater | NA | invited | price |
| Parklands | B S | invited | price |
| Baden | B S | invited | price |
| Matheson Island | S | invited | price |
| Descharme Lake | D S | invited | price |
| Garson Lake | Special case | open (national) | technical, price |
| Mesilinka | D S | invited | price |
| Old Crow | D S | invited | price |

D = Drawings
B = Bill of Materials
S = Specifications

Material package tenders were generally by invitation. This procedure reduces time and expense and appears quite suitable for the modest scale of Demo projects. In a few small projects, such as Chetwynd. Local Office staff shopped around for the best deal in materials, almost down to a component level. In all but a few cases (Labrador, Quyon, Caramat and Garson Lake), low price was the basis for selection.

### Materials Delivery

In most projects located in the more accessible regions of Nova Scotia, New Brunswick, Quebec and Ontario, deliveries were made by truck, often on an on-demand

basis. Several projects, however, were faced with difficulties in the delivery of construction materials, and resolved these problems with varying degrees of success.

The Labrador project is an outstandingly successful example. CMHC staff prepared the drawings, specs and bill of materials and carefully supervised the quantities and sequence of materials being loaded. Materials were shipped in two containers per house, and almost no instances of missing materials were reported. This technique is partially responsible for the construction of these units at an average cost below program maxima, in a remote and high-cost area.

The Old Crow project was also faced with transportation difficulties, but the necessity of shipping partial loads by Hercules, and the lack of quick storage upon arrival led to many problems of missing or incorrect materials.

Helicopters were used for the Garson Lake project, after a truck trying to use the winter road disappeared. The helicopter cost was equivalent to about two house packages, and a wiser course would have been to wait until the winter road firmed up; but this was not possible to do within the limited life span of the project.

## 4.9 Construction Process

In most projects the clients and/or their friends and relatives, were intended to carry out most of the construction. It was recognized, however, that some specialized work would have to be done by professionals, especially electrical work and the roughing-in of plumbing. Generally speaking, this scenario has been followed, as indicated in Table 18, which shows work that was *primarily* carried out by subs or the CM's.

**Table 18: Type of Work Subcontracted**

| Project | Electrical | Plumbing | Heating | Other |
|---|---|---|---|---|
| Labrador - Coastal | yes | yes | yes | |
| Labrador - Sheshatshit | yes | yes | yes | water/sewer, part foundations, framing |
| Preston | yes | yes | yes | foundations, water/sewer |
| New Brunswick | yes | yes | yes | foundations, drywall fin.,kitchen cab. |
| Latuque | yes | | yes | foundations, water/sewer, drywall |
| Letang | yes | yes | yes | blasting, foundations, doors/windows, cabinetwork |
| Quyon | yes | | | excavation, foundations, drywall |
| Caramat | part | yes | part | cabinetwork |
| Chetwynd | yes | | | excavation, water/sewer, foundations |
| Silverwater | yes | | | excavation, water |
| Parklands | yes | yes | yes | excavation, grading, clg.insulation, floor |
| Baden | yes | yes | yes | excavation, grading, clg.insulation, floor |
| Matheson Island | | part | yes | water, part foundations , roofing, drywall |
| Descharme Lake | NA | A | | |
| Garson Lake | NA | NA | | |
| Mesilinka | yes | yes | yes | excavation, sewer, drywall finish |
| Old Crow | yes | yes | yes | gravel pad, grading, HRV installation |

In carrying out the field surveys, efforts were made to identify the proportion of work done by the main actors involved in the process, but these estimates (necessarily based on the retrospective calculations of construction managers) are very rough. This is especially relevant in that some projects had not been completed at the time of the field survey. Nevertheless, the percentage breakdowns provided in Table 19 provide a useful approximation of the effort put into the process by those involved.

**Table 19: Approximate On-Site Labour Inputs by Participants**

| Project | Approximate Percent of On-Site Labour Performed by: | | | |
|---|---|---|---|---|
| | CM | Subtrades | Clients | Volunteers |
| Labrador - Coastal | 0 | 20 | 35 | 35 |
| Labrador - Sheshatshit | 20 | 20 | 50 | 10 |
| Preston | 10 | 25 | 25 | 40 |
| New Brunswick | 10 | 20 | 25 | 40 |
| Latuque | 30 | 20 | 30 | 20 |
| Letang | 20 | 20 | 55 | 5 |
| Quyon | 5 | 35 | 50 | 10 |
| Caramat | 30 | 5 | 35 | 30 |
| Chetwynd | 5 | 20 | 65 | 10 |
| Silverwater | 5 | 20 | 50 | 25 |
| Parklands | 15 | 35 | 25 | 25 |
| Baden | 15 | 35 | 45 | 5 |
| Matheson Island | 10 | 40 | 40 | 10 |
| Descharme Lake | 15 | 0 | 65 | 20 |
| Garson Lake | 70 | 0 | 30 | 0 |
| Meslinka | 30 | 20 | 30 | 20 |
| Old Crow | 5 | 30 | 60 | 5 |
| Average, all units | 17 | 21 | 44 | 16 |
| Fishing Lake | 0 | 100 | 0 | 0 |
| Kikino | 0 | 85 | 10 | 5 |
| Garden River | not visited | | | |
| Paddle Prairie | not visited | | | |

NOTE: In some cases, "volunteers" were paid trhough local manpower programs

Table 19 indicates that the percentage of funds provided by CM's varied from 0% to 70%, with an average of about 17%. The data are for on-site labour, not including the CM's normal coordination role. In the Table, the proportion of CM on-site labour should therefore be 0% in the normal case; the relatively high percentages for CM's therefore reflect projects where clients and/or schedules ran into trouble.

Rough estimates of client participation in the construction process indicate a considerable diversity of effort. In some of the projects where participation was low (Preston), clients were mainly mother-led families; in others (New Brunswick, Parklands

and Mesilinka) the clients lacked time, or had no previous construction training. Fortunately, several of the projects with low client participation rates had a high rate of volunteer turnout, underlining the need for a good balance between client and volunteer participation. In general, field surveyors had the impression that clients with regular jobs had more difficulty finding time to do the work; fortunately for the Program, many clients had only seasonal jobs.

Some projects continued the 1986 pattern of using contractors to carry out drywall taping and sanding work (see Table 18), on the basis that this is a highly skilled operation which is easily botched by amateurs. In most projects, however, drywalling was undertaken by the clients. In some of these areas, the CMs' contracts ended before the drywall was complete, an unfortunate situation. In future, we suggest that CM contracts be extended, or that some alternate source of on-site expertise be made available for finishing up projects.

## 4.10 Construction Quality

Despite the consistent methodology used in the survey, the assessment of the overall quality of units is a very subjective procedure. After considerable debate, the field surveyors came to a consensus that there may have been a slight reduction in quality this year compared to 1986, probably reflecting the wider use of non-conventional construction techniques in 1987, the exceptional effort made by CMHC and clients in the start-up year of the Program, and the greater focus placed on technical aspects of the program in this year's monitoring work. In any case, the construction quality is quite satisfactory and is similar to that which might be expected from private-sector builders of low-cost houses in such areas. A summary of average quality scores, ranked in order, is presented in Table 20.

Several activity areas were ranked higher than average (3.0), including lot suitability, foundation/basements, insulation, windows/doors, heating systems and roof ventilation. The high ranking for foundations/basements reflects, in part, the use of professional contractors in projects in Preston, New Brunswick and Quebec. Several other construction activity areas, some of which are shown in Table 20 and others which are taken from other notes, are of specific interest:

Framing did not present major problems, but there were cases of poorly executed work that had to be redone, including non-level basement bearing walls and poorly-fitting sheathing on crawl space walls. These cases and another, where the preserved wood supplied was not used for foundations, occurred in projects where supervision by the CM was poor or intermittent.

Attic and crawl space hatches were sometimes installed on the interior of units instead of the designed exterior locations. The Labrador project provided many instances of attic and crawl space hatches being placed in the house interior instead of the designed exterior locations and Garson Lake houses had attic hatches installed within the houses. The placement of crawl space hatches within houses, as in Parklands and Baden, is not problematic, since these units have no AVB in the suspended floor.

While more convenient for the occupants, interior locations of attic hatches allow a greater degree of air movement, and this can have very adverse effects, especially if warm and moist interior air migrates into attic spaces. The attic hatch installations that were seen were not of high quality, and this increases the concern about condensation in attic spaces. Interior location for crawl space hatches are of concern only where the floor has an AVB, and such cases were not noted.

Field staff in some projects noted that doors or hatches leading into basements or crawl spaces from the outside did not take into account the frost penetration that might affect foundations through and around such relatively poorly insulated areas.

**Table 20: Average Quality Scores by Construction Activity Type**

| Construction Activity | Avg. Score | Comments |
|---|---|---|
| Lot suitability | 3.3 | |
| Foundation & basement | 3.2 | |
| Insulation | 3.2 | much of work not visible |
| Windows & doors | 3.1 | |
| Heating system | 3.1 | |
| Roof ventilation | 3.1 | some work will be completed |
| Siding | 3.0 | some work will be completed |
| Plumbing | 3.0 | |
| Framing | 3.0 | |
| Drywall | 2.8 | |
| Air vapour barrier | 2.8 | much of work not visible |
| Other interior finishes | 2.7 | some work will be completed |
| Ventilation system | 2.1 | low score partly due to system design |

Scores were assigned by consultant field staff on a 5-point rating scale, where 1 = poor/low, 3 = average and 5 = excellent. A score of three indicates work equal to what would be expected in a low cost private sector house in the same area. Scores are based on work visible and reports by CM's and CMHC inspectors of deficiencies noted by them and do not represent a thorough inspection. Averages are based on average of all individual houses assessed.

Door installation appeared to provide problems for clients in some cases, resulting in poorly-fitting doors. An associated problem was the low quality of hardware used in some projects.

**Drywall finishes** were not generally of high quality, as might be expected of a program with an amateur work force. In some cases, this was due to CM's leaving the project because their contracts had expired before drywall finishing began. Wood panelling was used in some projects, and this appears to offer a surface that is much more durable and less sensitive to the skills of the workmen.

**Air-vapour barriers**, where visible, were generally of mediocre installation quality. Sealants were not generally used, nor was a high degree of care taken with overlaps, especially at window and door junctions. (see also Construction Notes).

**Ventilation systems** were sometimes not given a quality assessment because they were incomplete, but where scored they were usually given poor marks. These ratings did not generally reflect the quality of workmanship, but rather the nature of the installations, which often lacked the features necessary to assure good ventilation. For example, many installations consisted of manually-switched bathroom and kitchen fans which are not likely to be switched on except for short periods. Such systems will be ineffective in providing the air change needed, especially in the absence of makeup air provision in relatively air-tight houses. Some designs used dehumidistat-controlled fans or central air exchangers, which offer a far superior ventilation regime. Projects with good ventilation systems include New Brunswick and Old Crow. The lowest scores generally reflect designs where combustion equipment was provided without make-up air supplies.

## 4.11 Program, Project and Unit Costs

**Basis of Cost Data**

Cost data on projects are shown in summary form in Table 21 and 22, and in detailed form in the Cost Table (Appendix 2). Data were derived from the latest Commitment Authority forms available at the time of the interviews, while projects were very often still at the "soft" stage, modified according to final estimates provided by CMHC staff. Generally speaking, modifications consist of changes in, for example, subtrade costs, with a corresponding increase or decrease in the project contingency.

The cost data have been developed in the tables to show several different cost breakdowns, all calculated on a cost-per-unit basis. These include:

**Total Final Project Cost:**
Cost per unit as authorized in project commitments, adjusted by later estimates made available by CMHC staff in the field.

**Supplementary Contributions:**
Contributions to the project by clients, municipalities, extra contributions, or other sources. Extra CMHC staff time and travel costs are also included where these have been paid for out of other non-Demo budgets.

**Land and Services:**
The actual cost or estimated value land and site services, whether paid for out of project funds or contributed by clients or others.

**Net Construction Cost:**
The Total Final Project Cost minus the amount for Land and Site Services. This total is used extensively for comparative purposes, since the amount for Land and Services is highly variable.

**Table 21: Project Overview Cost Data**[12]

| Project | Total Final Project Cost | Total Final Project Cost per unit | Net Construction Cost per unit | Net Constr. Cost/unit per Equiv.Sq.Ft. |
|---|---|---|---|---|
| Labrador - Coastal | 335198 | 37244 | 41329 | 42.65 |
| Labrador - Sheshatshit | 137574 | 34394 | 38478 | 39.71 |
| Preston | 332000 | 41500 | 40700 | 30.40 |
| New Brunswick | 235700 | 39283 | 37183 | 36.42 |
| Latuque | 189861 | 37972 | 36838 | 26.93 |
| Letang | 252480 | 50496 | 46345 | 33.88 |
| Quyon | 202500 | 40500 | 43386 | 29.28 |
| Caramat | 83300 | 41650 | 57625 | 47.47 |
| Chetwynd | 120000 | 40000 | 32667 | 28.14 |
| Silverwater | 199900 | 39980 | 45387 | 33.25 |
| Parklands | 225105 | 32158 | 35429 | 43.05 |
| Baden | 95504 | 31835 | 35035 | 34.76 |
| Matheson Island | 158451 | 39613 | 45313 | 31.27 |
| Descharme Lake | 207500 | 41500 | 47560 | 49.54 |
| Garson Lake | 249000 | 41500 | 45016 | 48.93 |
| Mesilinka | 205556 | 41111 | 47571 | 50.45 |
| Old Crow | 275000 | 55000 | 60920 | 77.41 |
| **Average, all units** | **206155** | **40283** | **42851** | **38.19** |
| Fishing Lake | 75800 | 37900 | 36900 | 44.57 |
| Kikino | 111000 | 37000 | 41000 | 46.38 |
| Garden River | 149915 | 37479 | 41229 | 40.90 |
| Paddle Prairie | 39468 | 39468 | 41868 | 44.73 |
| **Average, all units** | **94046** | **37618** | **40358** | **43.85** |

For definition of Equivalent Sq.Ft., see footnote 6

### Project and Unit Costs

Program allocations (see Table 21) were generally $41,500 per unit, with the exception of the Yukon project which received an extra $15,000 per unit from the YHC. In several cases, regional holdbacks of $1,500 per unit were being maintained at the time of the field trips.

Costs in most projects were, as in 1986, within program limits. The Total Final Project Costs per unit, which are the expenditures made within official project budgets,

12 Final estimates as of February 1988, but before project closeouts

varied from a low of $31,835 in Baden to a high of $50,496 in Letang[13], with a weighted average of $40,283. These data compare with a weighted average of $37,618 for units in the Alberta RHAP Program.

The most useful basis for comparing house costs, however, is the Net Construction Cost, which adds extra contributions, such as CMHC time and expenses, and removes the highly variable land and service costs from consideration. On this basis, Demo projects vary from a low of $32,667 (Chetwynd) to a high of $60,920 (Old Crow); with a weighted average of $42,851. The comparable weighted average for Alberta RHAP units is $40,358.

When the Net Construction Costs are related to the Equivalent Area of these units, the Demo projects span a range from $26.93/sq.ft. (Latuque) to $77.41/sq.ft. (Old Crow), with an average of $38.19. The Alberta RHAP units come in at a weighted average cost of $43.85 per sq.ft. (Equivalent Area). It is interesting to note that the Alberta units, although having a lower per-unit cost, are more expensive on a cost per Equivalent Area basis; mainly because of presence of basements in the Demo units, which increase the Equivalent Area with a very modest increase in marginal cost.

**Strategies to Reduce Costs**

Several strategies were used by Local Offices to keep project costs within limits. The Preston project repeated the pattern set in 1986, of assigning a Local Office inspector as CM, thereby transferring this cost from the project budget (see also Table 4); and low CM expenditures were achieved in a number of other projects..

In 1986, the requirement to pay for land and services in some projects led to difficulties in staying within budgets. The problem has been eased in 1987 by the expedient of favouring the admission of clients who could provide their own land. Although a good strategy in future projects, land will still have to be acquired for some clients, however, and the provision of water and sewer services can also cause a great strain on project finances. We therefore recommend that land and services should be paid for out of a separate budget.

**Expenditure Patterns**

An analysis of project costs (see Table 22) indicates that expenditures for Land and Paid Labour, and the value of Supplementary Contributions vary considerably across projects. The variation in Paid Labour expenditures range from 0 (Caramat) to 40.6% (Preston) of Net Construction Costs. These variations are due to the cost of installing water and sewer services in some projects and the presence of clients with land in others.

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13 The Letang project experienced cost overruns primarily because of problems related to the need to blast rock for basements. See the Letang project report, Volume 2 of this document, for details.

**Table 22: Selected Expenditure Patterns**

| Project | CM fees + expenses per unit | % NCC | Paid Labour per unit | % NCC | Suppl. Contrib. per unit | % NCC |
|---|---|---|---|---|---|---|
| Labrador - Coastal | 4425 | 10.7 | 417 | 1.0 | 4693 | 11.4 |
| Labrador - Sheshatshit | 3800 | 9.9 | 417 | 1.1 | 4693 | 12.2 |
| Preston | 0 | 0 | 16850 | 41.4 | 9250 | 22.7 |
| New Brunswick | 2889 | 7.8 | 12875 | 34.6 | 5683 | 15.3 |
| Latuque | 3005 | 8.2 | 11122 | 30.2 | 5100 | 13.8 |
| Letang | 2911 | 6.4 | 15900 | 34.8 | 2260 | 5.0 |
| Quyon | 3500 | 8.1 | 5400 | 12.5 | 6786 | 15.6 |
| Caramat | 4800 | 8.3 | 0 | 0 | 15975 | 27.7 |
| Chetwynd | 667 | 2.0 | 9333 | 28.6 | 6667 | 20.4 |
| Silverwater | 2000 | 4.4 | 5700 | 12.6 | 9560 | 21.2 |
| Parklands | 1749 | 4.9 | 7203 | 20.3 | 3271 | 9.2 |
| Baden | 2290 | 6.5 | 4253 | 12.1 | 3200 | 9.1 |
| Matheson Island | 407 | 0.9 | 10823 | 23.9 | 10700 | 23.6 |
| Descharme Lake | 2800 | 5.9 | 0 | 0.0 | 6060 | 12.7 |
| Garson Lake | 2333 | 5.2 | 0 | 0.0 | 3516 | 7.8 |
| Mesilinka | 3429 | 7.2 | 3018 | 6.3 | 7100 | 14.9 |
| Old Crow | 3800 | 6.2 | 7000 | 11.5 | 19820 | 32.5 |
| **Average, all units** | 2597 | 6.1 | 6812 | 15.9 | 6907 | 16.1 |
| Fishing Lake | 0 | 0.0 | 21900 | 29.3 | 3000 | 4.0 |
| Kikino | 0 | 0.0 | 16100 | 39.3 | 6667 | 9.4 |
| Garden River | 0 | 0.0 | 7600 | 9.7 | 3750 | 4.8 |
| Paddle Prairie | 0 | 0.0 | 9600 | 11.8 | 3000 | 3.7 |
| **Average, all units** | 0 | 0.00 | 13210 | 32.7 | 4400 | 5.8 |

NCC = Net Construction Cost; see definition in text below
Suppl. Contrib. = Supplementary Contributions

The largest entries under Supplementary Contributions represent client donation of land (Preston, Chetwynd, Silverwater and Matheson Island), and extra CMHC time and travel in the case of several projects., especially in Labrador, Preston, Quyon, Parklands and Mesilinka. As might be expected, the expenditures for Paid Labour is high in the Alberta projects; at an average of $13,210 per unit, slightly more than twice that spent for Demo units.

It is of interest to compare the total value of expenses for CM's, Paid Labour and CMHC staff and travel contributions across projects, since the saving in one category is often balanced by an increase in another. For example, Preston shows zero expenses for a CM, but a high value of CMHC contributions, while the Matheson Island project has low expenditures for CM, but high amounts for Paid Labour and the amount

of CMHC extra-project contributions. These data (see Table 23) represent the "soft overheads" of a project.

**Table 23: Soft Overheads**

| Project | Total of CM exp., Paid Labour exp., and CMHC Supp.Contrib., $ per unit | As Percent of Net Construction Cost |
|---|---|---|
| Labrador - Coastal | 9535 | 23.1 |
| Labrador - Sheshatshit | 8910 | 23.2 |
| Preston | 20975 | 51.5 |
| New Brunswick | 19781 | 53.2 |
| Latuque | 19227 | 52.2 |
| Letang | 21031 | 46.0 |
| Quyon | 15300 | 35.3 |
| Caramat | 19385 | 33.6 |
| Chetwynd | 10333 | 31.3 |
| Silverwater | 9700 | 21.5 |
| Parklands | 12095 | 34.1 |
| Baden | 9709 | 27.7 |
| Matheson Island | 14180 | 31.3 |
| Descharme Lake | 6620 | 13.9 |
| Garson Lake | 5849 | 13.0 |
| Meslinka | 13047 | 27.4 |
| Old Crow | 15700 | 25.8 |
| **Average, all units** | 17661 | 31.8 |
| Fishing Lake | 21900 | 59.4 |
| Kikino | 16100 | 39.3 |
| Garden River | 7600 | 18.4 |
| Paddle Prairie | 9600 | 22.9 |
| **Average, all units** | 13210 | 32.7 |

### Comparative House Costs

A comparison of Demo house costs with those of comparable units is of great interest, since it indicates the value of the voluntary aspect of the Demo Program. Approximate comparative net construction costs have been obtained in several areas, often for RNH Homeownership units, but sometimes for private-sector equivalents. These data (Table 24) indicate that the Demo units represent an approximate cost saving varying from 16% to 60%. It should be noted that the 16% differential is for Letang, a project that experienced cost problems due to the need for blasting. In our opinion, a saving of about 40% may be expected in the typical case.

Construction costs are variable across the country but, unlike other CMHC programs that use MUP limits, the Demo Program does not recognize this. It would

therefore appear sensible to consider setting Demo cost limits as a percentage of MUP limits for the region.

**Table 24: Comparative Unit Costs**

| Project | Net Construction Cost $ per Equivalent sq.ft | | Cost Reduction, % |
|---|---|---|---|
| | Demo Houses | Comparative | |
| Labrador - Coastal | 42.65 | 61.92 | 31 |
| Labrador - Sheshatshit | 39.71 | 61.92 | 36 |
| Preston | 30.40 | 41.32 | 26 |
| New Brunswick | 36.42 | | |
| Latuque | 26.93 | | |
| Letang | 33.40 | 40.20 | 17 |
| Quyon | 29.28 | | |
| Caramat | 47.47 | | |
| Chetwynd | 28.14 | | |
| Silverwater | 33.11 | | |
| Parklands | 43.05 | 54.56 | 21 |
| Baden | 34.76 | 54.56 | 36 |
| Matheson Island | 31.27 | 79.09 | 60 |
| Descharme Lake | 49.54 | 73.91 | 33 |
| Garson Lake | 48.93 | | |
| Mesilinka | 50.45 | | |
| Old Crow | 77.41 | 103.82 | 25 |

## 4.12 Other Issues

### Promotional and Training Materials

There will always be variability in the quality of CM's available, but part of the reason is a lack of explanation of the objectives of the program. Low cost promotional materials should therefore be prepared that explain the purpose of the program. This would also be useful for clients and municipal or other local officials. One problem that must be considered is whether languages other than English and French (such as Cree, Inuktituk) should be included. Except for the consideration of language, the production of such materials should be relatively quick and low in cost.

### Mortgage Documents

The mortgage instrument is worded like a conventional mortgage document, stating that the client is to make mortgage payments over a 25-year period. Although the reasons for expressing the 25-year forgiveness period as a normal mortgage payment requirement are understandable, this phrasing causes apprehension and confusion on the part of clients. Observation of the mortgage signature process indicates that most clients do not understand what they are signing and that they are relying on the word

of the project officer for reassurance. Clauses in the operational guidelines are more clear and might be added as a preamble statement of intent.

**Project Time Frames**

Although the program budget was approved earlier this year, problems with finding land and eligible clients led to work commencing in most projects in September or October. Most 1987 projects therefore followed the 1986 pattern of much of the construction taking place in winter conditions. It is difficult to build well in cold and dark conditions and such situations also increase the challenge of motivating clients and volunteers to participate to a high level.

In those communities that are only accessible by winter road, late schedules created serious problems -- the Garson Lake project, for example, suffered from delays in client selection, and this led to the necessity of airlifting in materials by helicopter in December. Several other isolated projects showed evidence of increased costs and difficulty due to a time squeeze, even if less dramatic than Garson Lake. In such cases, a strong case can be made for an overall project lifespan of 18 to 24 months. This would allow materials to be in place by the spring of the following year, and would reduce the problems that now occur in waiting for summer conditions to ship, then trying to squeeze construction into a very short time frame.

**Maintenance**

The few 1986 houses visited provide hopeful indications of future maintenance, but follow-up will be needed. The assessment of adequate maintenance is now a subjective process, and there are in any case no mechanisms for CMHC to take over a unit that is poorly maintained.

If reasonably simple, clear and objective maintenance standards could be established, a system could be established whereby CMHC would inspect the units once a year, at the time of the forgiveness anniversary. If the unit has not been adequately maintained, the forgiveness period could then be extended by one year. Although such a policy could create considerable public relations problems in politically sensitive areas, it would be a useful instrument to possess as a last resort.

The development of such a policy suggests ongoing administrative involvements and costs, as in the normal RNH program.

**Piggy-Backing**

There was little piggy-backing of other programs this year, except for the use of Manpower funds for labour in some projects.

**Rehab Demo**

The principles developed in the Demo Program could also be applied to rehabilitation. There are, for example, some 65 to 70 RNH units repossessed each year in Manitoba. The rehabilitation of such units using Demo principles (sweat equity,

CM's and groups projects) could provide useful units at low cost and would provide an orderly transition to homeownership for the clients. Perhaps an even more attractive option is to apply the principles (sweat equity and the use of a construction manager) developed in the Demo Program to the existing Residential Rehabilitation Assistance Program (RRAP), which has developed the specialized techniques and standards that are required for rehabilitation.

## 4.13 Client Views

Analysis of the client interview forms indicates several clear groups of responses, along with a number of incomplete or ambiguous replies that are less useful. Responses are reviewed below according to subject area. (See Occupant Table, Appendix 5 for tabulated data.)

### Previous Housing

All clients reported extremely poor previous housing conditions, and this was confirmed in those areas where these accommodations were visible.

### House Design Process

Those homeowners involved in the design process tended to be both partners, or the husbands only. Changes made to stock plans were minor, consisting mainly of eliminating or relocating closets, changing archway widths or moving locations of attic or crawl space hatches. Variations were also considerable in the selection of heating systems, or in the choice of which system was used for primary service. No major problems in the design process were reported.

### Construction Process

As in 1986, most clients would have preferred earlier notification in order to schedule construction in the spring.

### Construction Managers

Comments relating to the role of CM's were generally very positive, although this may have been affected by the presence of the CM during many interviews, and/or a desire to say good things about a Program that provided such an improvement in their housing conditions. Some problems were reported, however, mainly relating to a perception that CM's were not available at critical times. These cases tended to coincide with projects where CM's were seriously overextended. When clients were asked to what they attributed improvement in their skills, they put most emphasis on their own construction experience, followed by the learning they gained from construction managers.

**Homeowner and Volunteer Participation**

Experiences were diverse: some owners received little help from volunteers, while others had to turn them away. In many cases, volunteers were part of an extended family.

**Skills Improvement**

All participants learned new skills, many significantly so. Several respondents reported increased confidence in their abilities. The help of CM's and journeyman carpenters, and the work experience itself, were major factors. A five-level rating scale was used to assess the changed skill levels of clients,

1 = few skills
2 = some skills
3 = moderate skills
4 = skilled
5 = highly skilled

The 62 clients responding to this question reported that their construction skill level increased from an average of 2.4 to a level of 3.7. Because this rating is based on self-evaluation, and because it is subjective in nature, it should be treated with some caution; however, it does indicate a substantial improvement. When CM's were asked to rate the skill gains of clients, the levels for the 47 clients reported on were held to have increased from 2.0 to 3.1. Clearly, the CM's had a slightly lower opinion of client skills, but nevertheless saw a substantial improvement.

**Client Views and Satisfaction**

Most owners expressed a high degree of satisfaction with the Program, and they indicated that acquaintances held a similarly positive view. In this year's Program, there were no reports of negative community reaction.

## 5. Conclusions

The Program has now completed its second year of operations and, although this study did not include a complete evaluation, the Program is clearly successful in meeting its objectives. Success can be measured in a number of different ways:

- The production of units is on target (98 this year, compared to a target of 100).
- Except for one 1987 project, houses in both Program years have been delivered within the cost targets of $40,000 and $41,500 respectively; a figure that includes land, services, materials, labour, construction managers and miscellaneous fees.
- The 1986 Program generated opposition in a few locations, due to a perception that it was too generous, but program changes made the 1987 Program well accepted by other governments, communities and local residents.
- The Program has had a noticable impact in the small communities where it has been operative. Our only concern in this regard has been the perception in some regions that the larger sizes of the Demo units is limiting the local acceptability of the small units that have traditionally been built by other non-profit delivery agencies.
- Clients have obtained new houses that are vastly superior to their previous accommodation and have learned new skills in the process. They have also built up equity in their houses through their efforts, and are able to look forward to living in them without making heavy monthly payments. The clients are uniformly positive about their experience.
- The quality of work has been generally acceptable, certainly in the same quality range as comparable private-sector units built in the same areas.
- CMHC staff have gained valuable field experience in the process of designing and building housing that is appropriate for remote areas.

Although the Program has been very successful, the need for housing in the remote areas of Canada appears to be considerable. This need, and the success of the first two years of operation therefore suggest that the Program, or one like it, should continue to operate in these regions. With respect to further operations, we have the following recommendations for Program modifications:

- Consideration should be given to merging the Program with the regular RNH Homeownership Program, so that a uniform client selection process can be maintained.
- Expenditures for land and services should be separated from regular project expenditure items, to provide a more uniform basis for regular items. The resulting net cost ceilings should be varied across the country, possibly as a proportion of MUP ceiling costs, to reflect regional variations in the cost of construction.
- Pre-planning orientation sessions for CMHC field staff and construction managers should be established on a regional basis, so that all involved develop a better understanding of the objectives of the Program. An under-

standing of the need for client training and motivation by CM's should be given special emphasis.

- A simple and low-cost brochure should be prepared to explain the objectives and conditions of the Program. Such a brochure could be distributed to potential communities and clients, as well as being used in conjunction with the orientation sessions previously proposed and client orientation sessions.
- A series of standard plans should be developed for small "starter" houses that can easily be expanded by the clients at a subsequent date. Such designs, if chosen by clients as appropriate, would address the criticism that houses are too large and would reduce the initial construction effort, while maintaining options for subsequent expansion by the clients, using their newly acquired skills.
- Mortgage documents should be simplified, so that they are more understandable in the context of the program structure.

# Volume

# 2

Canada Mortgage and Housing Corporation

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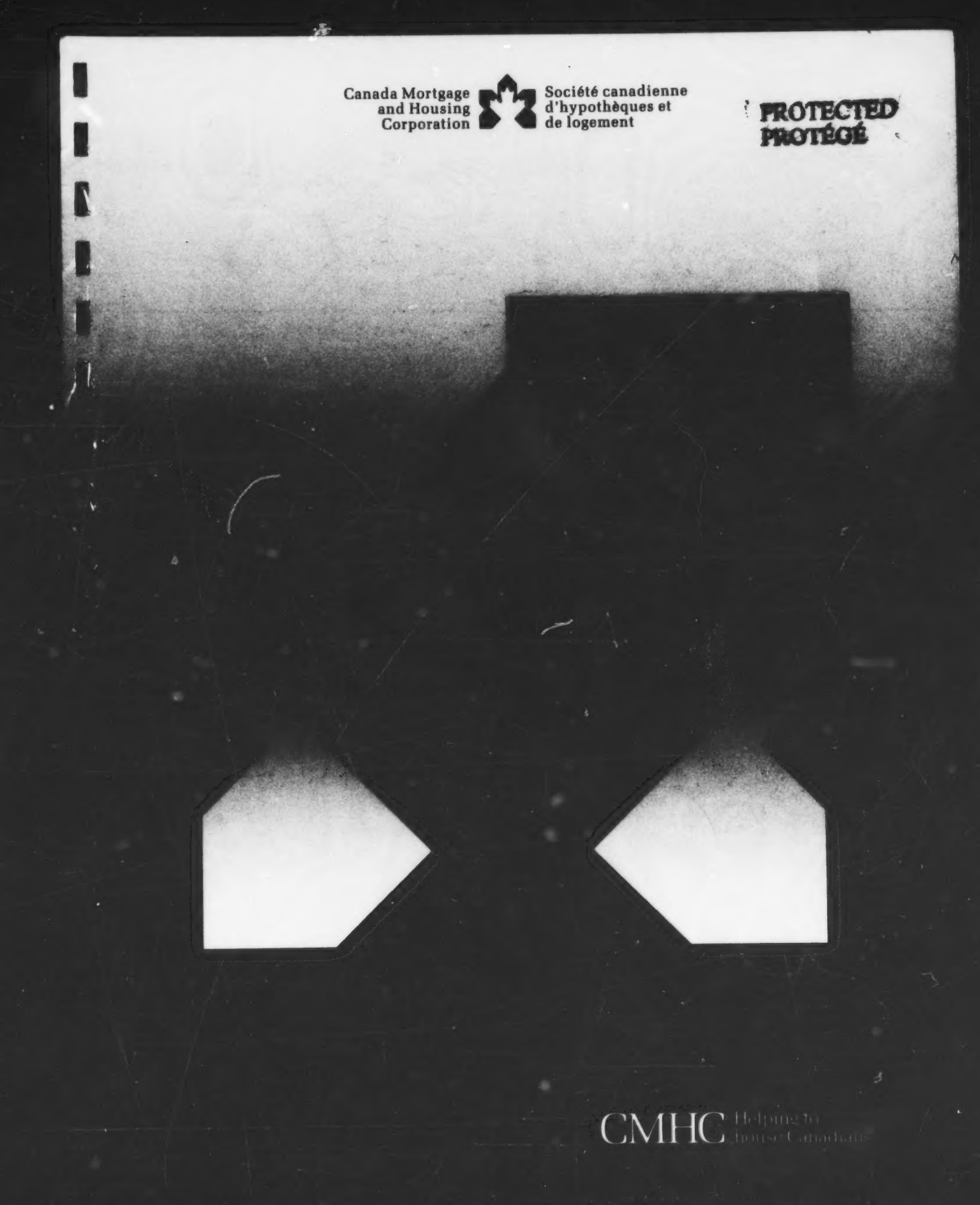

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# 1987 Monitoring of the CMHC RNH Demonstration Program

## Volume 2: Project Findings

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Project Manager for CMHC was Norbert Koeck, while Dan O'Leary was responsible for project administration.

Project staff consisted of the following:

| | |
|---|---|
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| Chris Jalkotzy | Preparation of drawings |
| Dr. George Pandi | Data Analysis |
| Dave Redmond, Ekos | Review of survey instruments |

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## Foreword

This report presents the results of an assessment of 16 projects funded under the Rural and Native Housing Demonstration Program (RNH), and two projects funded by CMHC and the Alberta Rural Home Assistance Program (RHAP).

The Demonstration Program provides building materials and technical assistance to selected participants to help them build their own houses. The Program is a development of ideas first tested in the RHAP Program and a similar program developed by the Northwest Territories Housing Corporation, the Homeownership Assistance Program (HAP). These ideas were subsequently endorsed by the Nielsen Task Force. Although low-income people living in rural and remote areas have traditionally constructed their own houses, they are generally of very poor quality and have limited lifespans.

It is generally financially impossible for such people to build houses of adequate size and quality, and previous government efforts to provide contractor-built houses for them have proven to be expensive to build and to administer. Worse, conventional program approaches do not take advantage of the skills and energy of low-income rural and remote people, many of whom would still like to build their own houses. The result is to undercut the independence of such people and, in practical terms, to foster an attitude of indifference to the maintenance of their houses.

The objective of the Demonstration Program is to develop and test the capacity of this clientele to build their own houses by providing materials and expert help.

The 1987 Monitoring Report follows the approach taken in the 1986 report, and consists of three volumes. Volume 1 contains an overview of the operations of the Program, while Volume 2 provides details of each project and Volume 3 presents a collection of all the major housing designs used in the Program.

## Study Methods And Procedures

This study has been based on file data collected from the National and Local Offices of CMHC and information gathered in the field. Sixteen RNH Demonstration projects were visited as well as two Alberta RHAP projects. Two Demonstration projects (Sheet Harbour and Sydney) had not been started during the field work period and were not visited; nor were two RHAP projects, one of which had not been started. In any case, the projects not visited contain only seven units, and therefore do not constitute a major proportion of either program.

Field data were gathered by means of semi-structured questionnaires designed for application at the Branch/Local Offices of CMHC, the project level and the house or client level. Field experience indicates that the questionnaires became more relevant and useful as we descended downwards in scale, towards the house and client level. Demo houses were photographed, inspected for quality and code violations, the homeowner interviewed and changes made to the original design were noted. Houses built under the 1986 Demo program that were close to the 1987 sites were also visited and given a skim review to obtain an assessment of the degree to which these are being added to and maintained.

In each project, efforts were made to visit at least one house of each type and to interview all the occupants living in them. In many projects, a 100% sample was achieved, but in others clients could not always be found, nor their houses visited. In any case, information about houses and their occupants is available for 69 of the 87 houses that were under construction at the time of the field work; a higher proportion than in the 1986 field work.

This is a monitoring study, with a descriptive, rather than deeply analytic approach, and is based on case study data gathered prior to the completion of projects. As such, much of the data does not satisfy the standards for statistical validity that would be required in a full-blown evaluation. Assessments of the proportion of on-site labour performed by various types of participants, for example, are based on the retrospective judgements of construction managers and are therefore very approximate in nature -- these data have nevertheless been included since the 1986 study showed them to be a useful comparative indicator of the character of these projects.

Responses of clients to the evaluative questions in the Client Surveys should also be treated as general indicators of opinions and trends, due to the small sample sizes and the variation in willingness to respond among some of the very varied cultural groups that form the Demo clientele. Finally, data on project costs are based on preliminary budget estimates, and final data on project costs will have to await the closing out of projects.

Despite these limitations and difficulties, the usual ones besetting a project that involves the collection of primarily "soft" data, we believe that this report fairly depicts what has taken place in the field.

## Table Of Contents

**Atlantic Region**

Provincial Overview, Labrador Projects . . . . . 1
Labrador Coastal Communities . . . . . 6
Sheshatshit . . . . . .11
Preston . . . . . .15
Sydney . . . . . .23
New Brunswick . . . . . .26

**Québec Region**

Latuque . . . . . .32
Letang . . . . . .42
Quyon . . . . . .51

**Ontario Region**

Caramat . . . . . .58
Chetwynd . . . . . .67
Silverwater . . . . . .72

**Prairie Region**

Parklands . . . . . 79
Baden . . . . . .93
Matheson Island . . . . . 101
Descharme Lake . . . . . 107
Garson Lake . . . . . 119

**British Columbia/Yukon Region**

Regional Overview . . . . . 134
Mesilinka . . . . . 136
Old Crow . . . . . 143

**The Alberta RHAP Program**

The RHAP Program . . . . . 151
Fishing Lake . . . . . 153
Kikino . . . . . 157
Garden River . . . . . 161
Paddle Prairie . . . . . 164

## Provincial Overview, Labrador Projects

| | |
|---|---|
| CMHC Branch: | St. John's |
| Program Officer: | Dave Morris, Chief Inspector |
| Other Staff: | Marvin Whalen, Inspector |

### 1. Overview

This project consists of thirteen units located in three communities on the Labrador coast and an Indian settlement near Goose Bay. Staff of the St. John's CMHC Branch designed the units and supervised the work. Two construction managers were hired; one for the three coastal communities of Makkovik, Postville and Rigolet, and another for the Indian community of Sheshatshit. The project is unique in that the CM's performed all subtrade functions as well as their normal CM functions.

The project was carried out with despatch, considering that five of the thirteen units were a late allocation. Inspection of the projects reveal that clients are generally pleased with their units. There are some construction deficiencies which mainly reflect the excessive tasks being carried by the construction managers.

Following an initial project overview below, further discussion of the Labrador project is split between Sheshatshit and the three Labrador communities of Makkovik, Postville and Rigolet. This approach is followed because one construction manager was responsible for Sheshatshit, while another was appointed to handle the other three communities. In addition, there are ethnic and locational differences between the two groups of communities that make separate treatment a logical approach.

### 2. Program Organization

A similar organizational approach was taken in all communities. CMHC St. John's took the lead in the project. Staff chiefly involved included Dave Morris, Chief Inspector and Marvin Whalen, another inspector. The two CMHC staff designed the houses, prepared drawings, specifications and bills of materials and ensured that materials were delivered in containers to the sites. All clients in the four communities were able to choose between the two designs.

One construction manager was appointed to supervise work in the three communities of Makkovik, Postville and Rigolet, while a second construction manager was hired for the subsequent work in Sheshatshit. Unlike other Demo projects, both construction managers carried out various subtrade tasks in addition to their responsibilities for construction management.

The two Commitment Authority Forms indicate that incomes have not yet been verified.

### 3. Community Selection

The community selection process was carried out by CMHC in cooperation with the Torngat Regional Housing Association, the housing policy arm of the Torngat Regional Development Association, which in turn is an agency of the Labrador Inuit Association. Torngat's main mandate is to promote economic development in 5 Inuit communities. Torngat has set up housing associations in each community, which CMHC uses for local liaison. In the case of the Demo Program, Torngat provided lists of potential communities and clients which were adopted by CMHC with only minor modifications.

The selection process was based on consideration of existing housing conditions, community organization and interest, availability of skilled labour, availability of land and suitable clients. All six coastal communities were visited during the selection process.

The original intent (according to internal memos of 16/04) was to put five units in Hopedale, and additional units in Makkovik if available. After a visit to all communities by CMHC staff it was recommended (28/04) that 2 units be allocated to Hopedale and 3 to Makkovik. It proved too difficult to find eligible clients in Hopedale, however, and allocations to each community were as follows: Makkovik: 3 units, Postville: 2 units and Rigolet: 3 units.

The allocation was subsequently increased to 13 units in four communities plus the community of Sheshatshit, as 5 units were released from other areas (3 from PEI, 5 from NWT & BC). Final allocations were Makkovik: 4 units, Postville: 2 units, Rigolet: 3 units and Sheshatshit: 4 units. Whereas the first allocation was approved in August, the additional five units were only approved in early October. The timing of the second batch of units increased difficulties in the field, but it appears that all construction will be complete before the March 31 limit.

Not all of Torngat's client recommendations were adopted. Torngat's priority list for Makkovik, for example, included a man in his 70's who was clearly in need of housing, but not suited for the self-build requirements of this Program.

### 4. House Designs

Two house designs were prepared by CMHC staff for use in the four communities. One is based on that used in last year's Nain project, while a second is based on a design developed by an Indian band in Davis Inlet.

All units are based on 2 x 6 stud construction, high-heel roof trusses, clear span floor trusses and PWF foundations. Interior wall finishes are 1/2" plywood panelling, while plain G1S plywood is used as a ceiling finish. Exterior finish is 3/4" sawn clapboard, fastened with the rough side out for better paint and stain adhesion.

Both designs rely on air-tight wood stoves as a primary heating system. In Sheshatshit electric baseboard units are used as back-up, but in the three coastal communities, downdraft oil furnaces had to be used because of the limited local power sup-

plies available. Unfortunately, the smallest units that could be acquired have a capacity of 100,000 BTU -- these units are grossly oversized for such small and relatively energy-efficient units, and also occupy an excessive amount of valuable ground floor space. At the time of the field trip, Newfoundland Hydro gave CMHC their support for the use of electric baseboards in future units, since backup heat will be used infrequently.

All units have complete 3-piece bathrooms, kitchen sinks and hookup for washing machines. However, while the Sheshatshit units are on well and septic tanks, units in the three coastal communities are waiting to be connected to extensions of municipal water supply and waste disposal systems. Until these systems are extended, clients are using bucket systems.

Another feature shared by all the Labrador designs is the very small windows used. The advantage in this project was that a single standard window unit could be ordered, but the use of such units in living areas does create a somewhat enclosed and gloomy aspect.

The Nain design is a relatively conventional three-bedroom unit, with living areas located in at one end and bedrooms at the other.

The Davis unit has one partition running down the length of the house, which leaves the whole front of house as basically one open space, a feature which is useful in allowing clients to mend tents etc. The original Davis design was modified to add storage space and a bathroom. The Davis unit was chosen by Sheshatshit clients. One client moved a door from the side to the front, which gave more space in storage room, while another subdivided the long space.

## 5. Materials Tendering And Delivery

The 1986 Demo project in Nain experienced some problems due to the delivery of bulk materials to the site. At the time, CN Marine was not able to ship containers or even to offload slings of plywood. A common bundle was delivered to the site, and clients took materials as required. The result was that it was not possible to know how much material was shipped or how much was missing. According to the CMHC project officer, these factors were largely responsible for last years high prices.

This year, new CN Marine facilities allowed the delivery of materials in shipping containers right to the sites. This mode of delivery ensured that all materials would be delivered and that none would be stolen or mislaid en route. This is of some importance in this region, where shipping is cheap but where supplementary air deliveries are extremely expensive.

The CMHC inspector in charge of this operation prepared a bill of materials which formed the basis of am open tender call. The winning bidder had the second lowest price. The CMHC inspector stayed in close touch with the operation, to the extent of spending time at the warehouse to ensure that all components were loaded and in the correct order.

Two twenty-foot containers were shipped for each house -- the first contained all materials necessary to close in the house, while the second contained finishes, mechanical and electrical components. The containers were loaded in reverse order, then locked and delivered to the sites. The first containers arrived in the three coastal communities in the Aug.19-26 period, while the second batch were delivered to Sheshatshit and Makkovik in the Oct.20-22 period. Problems were experienced when it was discovered that the weight of the containers (up to 35000 lbs) and the lack of handling equipment at the sites prevented movement of the containers from docks to building sites. The containers were therefore unloaded and trucked up to the individual building sites and clients were then responsible for their own bundles.

## 6. Project Costs

The following table provides an outline of initial and final cost estimates for the combined Coastal/Sheshatshit project:

**Table 1. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 3250 | 488 | 0.1 |
| land | 1950 | 6700 | 1.4 |
| fees & permits | 2600 | 663 | 0 |
| construction manager | 65000 | 55025 | 0.1 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 1625 | 500 | 0.1 |
| materials package | 390000 | 381401 | 80.5 |
| extra freight costs | 13000 | 9500 | 2.0 |
| equipment rentals | 0 | 0 | 0 |
| labour contracts | 0 | 0 | 0 |
| site prep | 4225 | 4225 | 0.9 |
| site services | 13000 | 1200 | 0.3 |
| miscellaneous | 0 | 0 | 0 |
| material storage | 15600 | 3070 | 0.6 |
| contingency | 9750 | 10000 | 2.1 |
| **Total** | **520000** | **472772** | **100.0** |
| Other Contributions: | | | |
| CMHC | | 61000 | |
| Est.Actual Total Cost | | 534772 | |
| Land & Services (Deduct) | | -7900 | |
| **Est.Net Construction Cost** | | **525872** | |

### Cost Breakdowns

| | Project$ | $/unit | Avg.Eq.area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 520000 | 40000 | 969 | 41.28 | 444 |
| Net Constr.Costs | 525872 | 40700 | 969 | 41.75 | 449 |

The first tender resulted in the acceptance of a contract for 5 Nain-type and 3 Davis units on August 12. Per-unit costs were $29,282 and $28,295 respectively. After the Region was allocated an additional five units the original bidder was awarded an additional contract for one Nain unit ($29,282) and four Davis units ($26,727 each). These prices were FOB at dockside and did not include shipping. Costs for the second batch of Davis-type units, with four units destined for Sheshatshit and one for Makkovik, were lower because of their electric baseboard backup heating systems.

Costs have been reduced from the 1986 average of $41,500 per unit, and Dave Morris estimates that final project) costs this year are likely to average $37,500 per unit. There are several reasons for lower costs this year. One of the biggest savings has been in land and services, since land has been provided free by Community Councils (except for surveying costs) and municipal services will shortly be installed by the communities. The use of shipping containers also contributed to lower costs, as did the contracting of subtrade activities to the construction managers.

## 7. Views On The Program

Mortgage documents were being signed during the field trip, and it was evident that the mortgage document can use some improvement. Although the Demonstration Program involves no client payments, the mortgage document makes reference to payments and default on payments, which, although possibly rational from a legal point of view, does not make sense to clients or field staff.

A problem inherent in the design is the lack of adequate provision for ventilation and combustion make-up air. It is unlikely that the manually-operated bathroom and kitchen fans will be switched on except in unusual circumstances.

Last year's project in Nain experienced difficulties in the use of poured concrete for footings, but the greater emphasis on PWF footings this year has brought out bigger problems, mainly in clients' attempts to establish level ground. Most clients ended up pouring their footings.

General opinions of the program are very positive. Part of this is attributable to the clients' very inferior previous living conditions, but it is clear that the new houses are good accommodation on any terms. The overall success of the program must be qualified by noting that the Coastal Communities project suffered somewhat from the construction manager not having enough time to spend with his clients, due to his project consisting of nine clients in the three villages. The Program staff intend to ensure a more manageable workload next year.

## Project Report: Labrador Coastal Communities

| | |
|---|---|
| Communities: | Makkovik, Postville and Rigolet |
| Project Officer: | Dave Morris, CMHC St. John's |
| Construction Manager: | Larry Penny |
| Date of visit: | Jan 25-28, 1988 |
| Visited by: | Nils Larsson |

### 1. Project Overview

The project consists of 9 houses in the three coastal Labrador communities of Makkovik, Postville and Rigolet. The villages are primarily Inuit in social composition, with populations ranging from 250 to 450. They are inaccessible by road and the severe climate limits shipping to the summer months. Main occupations are fishing and hunting, supplemented by unemployment insurance payments.

Dates of Key Project Events (not necessarily in order of occurence)

| | |
|---|---|
| Project commitment | July 9 |
| General information sessions | early May |
| Homeowners selected | April |
| Materials tender awarded | Aug. 12 |
| Work begun on site | Aug. 25 |
| First house framed | Nov. 15 |
| First house closed in | Dec. 1 |
| First family moved in | Dec. 10 |
| Last family moved in | Feb. 15 (est) |
| Work ended on site | Feb. 15 (est) |
| Project closed out | March 1 (est) |

### 2. Delivery Organization

CMHC St. John's staff was responsible for design, materials tendering and materials delivery. CMHC also selected the construction manager and supervised his work. Since the CM was also carrying out subtrade tasks, CMHC was also, in effect, directly supervising subtrade activity.

The construction manager for the coastal communities was one of the two selected for the 1986 program. Strictly speaking, this does not satisfy the Operational Guideline requirement for a competitive process, but both candidates passed such a process last year and had proven credentials. Larry Penney was contracted to carry out all electrical, plumbing and heating work (not including supply of materials) as well as CM duties for nine units in the three coastal communities. The combined duties reflect the difficulty of finding good tradesmen on the Coast and the view of CMHC St.John's that coordination difficulties would be minimized.

The original contract called for the CM to complete the work for 8 houses between the Sept.14 to Feb.12, for a total fee of $35,400, for an average cost of $4,425 per unit. The tasks outlined in the contract are extensive and it is doubtful that any one in-

dividual could fulfill them completely. In this case, the CM lacked leadership and motivational skills. While some clients were extremely skilled, most were not. Members of this latter group expressed disappointment at the lack of leadership and lack of availability of the CM.

### 3. Community And Client Selection

The CMHC inspection staff interviewed 21 persons during the initial process, from candidates proposed by Torngat and the local Housing Committees. Each applicant completed a Homeowner application form and was made familiar with the Program. The present housing conditions of all candidates were assessed by means of an inspection.

Nain-type unit in Makkovik

### 4. Information And Training

Since clients were selected early in the process, CMHC sponsored information sessions early in the spring. Clients were able to choose between the two designs prepared by CMHC. One respondent indicated that very little time was available to make a choice, while another suggested that the choice would have been easier if an exterior sketch had been available.

There was essentially no training provided to clients in these coastal communities, except for occasional on-the-job supervision. Respondents indicated that most of their learning experience occurred through the intervention of relatives or friends, or through their own efforts. The main reason for the lack of training, which had consequences in the quality of work, was that the construction manager was somewhat overloaded with his subtrade tasks (all plumbing, heating and electrical work); and the need to commute between the three communities added to the difficulty. In addition, it must be mentioned that the CM did not appear to possess the motivational or leadership qualities necessary to embark on a training program.

Volunteer labour was extensive and mainly provided on an individual basis.

## 5. Site And Servicing Issues

Makkovik and Postville have sandy and well-drained soil, whereas Rigolet has a combination of bog and rock. In all cases, however, units were built directly on grade, in accordance with local custom.

In these three coastal communities, the Demo project has spurred the Community Councils into agreeing to extend municipal services to the building sites. At the time of the field work, it was reported that the installation of services would occur during 1988, but comments from clients indicate skepticism about this timing.

## 6. Construction Process

The following table provides an approximate breakdown of the proportion of on-site labour provided by the various types of participants. Note that the CM also undertook subtrade tasks.

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM. | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 0 | 0 | 0 |
| Water supply | 0 | 0 | 0 | 0 |
| Sewage | 0 | 0 | 0 | 0 |
| Electrical hookup | 0 | 0 | 0 | 0 |
| Grading | 0 | 0 | 0 | 0 |
| Footings/found.walls | 0 | 0 | 50 | 50 |
| Framing & sheathing | 0 | 0 | 50 | 50 |
| Insulation & AVB | 0 | 0 | 50 | 50 |
| Panelling | 0 | 0 | 50 | 50 |
| Roofing | 0 | 0 | 50 | 50 |
| Siding | 0 | 0 | 50 | 50 |
| Door/window inst. | 0 | 0 | 50 | 50 |
| Other interior finishes | 0 | 0 | 50 | 50 |
| Cabinetwork | 0 | 0 | 50 | 50 |
| Heating & Ventilation | --- 100 --- | | 0 | 0 |
| Plumbing & Fixtures | --- 100 --- | | 0 | 0 |
| Interior electrical | --- 100 --- | | 0 | 0 |
| **OVERALL** | **— 20 —** | | **40** | **40** |

The project developed in two major stages, reflecting the additional units allocated to the St. John's office in the Fall. Eight units were begun in Makkovik, Postville and Rigolet in September, while an additional four units in Sheshatshit and an additional unit in Makkovik were begun in November.

Work has been completed at a remarkably quick pace, considering the difficult conditions and the scattered locations. Nevertheless, many clients have been very much on their own during the process, and the result can be seen in certain quality lapses.

## 7. Construction Quality

Construction quality was generally adequate, with several exceptions, positive and negative. Most work that was visible provided evidence of a lack of inadequate supervision. In some cases, preserved wood intended for use in foundations had been saved for steps, and replaced by normal framing material. Bags of insulation were left in several crawl spaces, indicating a possible deficiency in attic or wall spaces. Front doors were poorly installed, with frames considerably askew in two instances.

Plywood panelling is used for all interior finishes. This produces an excellent and robust wall surface, but is less successful for ceilings, where butt joints and paint produce a makeshift appearance.

## 8. Views On The Project

All clients are pleased about the program, although several expressed their dissatisfaction with the role of the CM in this project. As previously outlined, the CM was seriously overstretched in trying to supervise the work of 9 clients in three communities, while simultaneously doing all electrical, heating and plumbing work. In addition, the CM lacked management and motivational skills. The CMHC Chief Inspector suggests that CM's should, in the future, be responsible for no more than four or five clients, all located in one community. Despite this problem, the project has turned out well, and the clients are living in accommodation that would have been impossible for them to have through any other means.

The planned introduction of municipal services in 1988 is, according to several clients, an optimistic assessment. If this is so, the clients will be without basic sanitary services for an extended period and they will have to rely on bucket systems. In such circumstances, it might have been advisable to plan on the use of composting toilets.

## 9. Costs

Although the Coastal project is not a separate project in budgetary terms, separate costs are shown below for the Coastal component. Where direct project overheads have not been identified, they have been prorated according to the number of houses.

## Table 2. Committed And Final Project Costs

| | Initial (8 units) | Final (est) (9 units) | Final % |
|---|---|---|---|
| pre-dev. expenses | 2000* | 338 | 0.1 |
| land | 1200* | 4638 | 1.4 |
| fees & permits | 1600* | 459 | 0.1 |
| construction manager | 40000* | 39825 | 11.9 |
| construction manager exp. | 0* | 0 | 0 |
| tools | 1000* | 346 | 0.1 |
| materials package | 240000* | 270211 | 80.6 |
| extra freight costs | 8000* | 6577 | 2.0 |
| equipment rentals | 0* | 0 | 0 |
| labour contracts | 10600* | 3756 | 1.1 |
| miscellaneous | 15600* | 9048 | 2.7 |
| **Total** | **320000*** | **335198** | **100.0** |
| Other Contributions: | | | |
| Clients | | 0 | |
| CMHC | | 42230 | |
| Est.Actual Total Cost | | 377429 | |
| Land & Services (Deduct) | | -5469 | |
| **Est.Net Construction Cost** | | **371960** | |

* Initial commitment was for 8 units

## Cost Breakdowns

| | Project$ | $/unit | Avg.Eq.area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 335198 | 37244 | 969 | 38.44 | 414 |
| Net Constr.Costs | 371960 | 41329 | 969 | 42.65 | 459 |

## Project Report: Sheshatshit, Labrador

| | |
|---|---|
| Local Office: | St. John's Office |
| CMHC Project Officer: | Dave Morris |
| Construction Manager: | Gerald Osmond |
| Date visited: | January 27, 1988 |
| Visited by: | Nils Larsson |

### 1. Project Overview

Sheshatshit is the fourth community in the 1987 Labrador Demo project. It is presented as a separate project because it is physically remote from the other community sites and because it has a separate construction manager. The project was initiated as a result of an extra allocation to St. John's Branch; but this also resulted in a late start.

Dates of key project events:

| | |
|---|---|
| Project commitment | Oct. 9 |
| Homeowners selected | October |
| Materials tender awarded | October |
| Work begun on site | Oct. 15 |
| Container arrived | Nov. 2 |
| Last house closed in | Dec. 1 |
| Last family moved in | Jan. 26 |
| Work ended on site | March 1 |
| Project closed out | March 1 |

### 2. Project Organization And Construction Manager

Due to the late date for approval of this project, a normal selection process could not be used. The Band Council was consulted and it recommended a former contractor who had built units in Sheshatshit for the Band. After an interview with CMHC, a contract was entered into which was approved by the Atlantic Region.

Gerald Osmond was selected as CM and to perform electrical and mechanical work for the project. The contract calls for CM, electrical and mechanical (labour only) duties to be carried out for 4 units, between October 16 and March 25, for a total of $15,200, or $3,800 per unit. This is a remarkably low cost for such a combination of duties. Mr. Osmond is skilled in construction methods and has a high level of leadership ability.

### 3. Community And Client Selection

Sheshatshit, the fourth community in the Labrador project, is a Montagnais Indian village of 550 people located close to Goose Bay and across the river from the predominantly white community of Northwest River. Sheshatshit had been used by the Montagnais during summer months, but was not permanently settled until around 1960.

Although Sheshatshit is accessible all-year by a road from Goose Bay, all freight must arrive by ship during the summer. Local sources of income include social assistance and some hunting and fishing. Some 95% of the local population uses wood for heating, which is available for a nominal permit fee. The Montagnais-Naskapi Innu Association is an active local association that is also active in Davis Inlet, a fact that helps to explain the use of the Davis Inlet plan in this community.

When five additional units became available to the St. John's Branch, it was decided to include Sheshatshit in the Program. The Sheshatshit Band Council had previously requested the Newfoundland and Labrador Housing Commission (NLHC) for 13 units. NLHC was considering a project, but deferred to the Demo Program when

Davis-type unit in Sheshatshit

units became available. The 13 families were then used as an initial selection for the Demo project, and were then interviewed and visited. Four families were selected (see tables).

**4. Site And Servicing Issues**

The village is well sited along the waterfront. Soil is well drained sand, which reduced construction problems. Mr. Benuen had his own land, but the three other

clients selected land available from Crown land controlled by the Band Council. CMHC will pay surveying costs for these parcels.

Water is obtained from 30' deep wells, while sewage is disposed of in septic tanks - three houses located close to each other are hooked up to one tank, while the other is on an individual tank. The clear effluent is then discharged into the lake, where tides clear it away from the shore.

## 5. House Designs

As in the other three communities, clients were able to select either the Nain or Davis type of plan. All chose the Davis Inlet plan, which is fully described in the Labrador Overview Report. One difference from the standard plan is that the Sheshatshit units do not have bedroom closets, in accord with Montagnais custom of storing clothing in bags. Another change, which makes these units about $2000 cheaper than the other Labrador units, is that electric baseboard heating is used as backup heating, instead of the 100,000 BTU oil furnaces used in those communities. This approach was possible in Sheshatshit because of its proximity to good Hydro supplies.

## 6. Construction Process

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 0 | 0 | 0 |
| Water supply | 80 | 0 | 20 | 0 |
| Sewage | 80 | 0 | 20 | 0 |
| Electrical hookup | 0 | 0 | 0 | 0 |
| Grading | 0 | 0 | 100 | 0 |
| Footings/found.walls | 50 | 0 | 50 | 0 |
| Framing & sheathing | 50 | 0 | 50 | 0 |
| Insulation & AVB | 20 | 0 | 80 | 0 |
| Panelling | 10 | 0 | 90 | 0 |
| Roofing | 20 | 0 | 60 | 20 |
| Siding | 10 | 0 | 60 | 20 |
| Door/window inst. | 10 | 0 | 90 | 0 |
| Other interior finishes | 10 | 0 | 90 | 0 |
| Cabinetwork | 10 | 0 | 90 | 0 |
| Heating & Ventilation | | --- 100 ---- | 0 | 0 |
| Plumbing & Fixtures | | --- 100 ---- | 0 | 0 |
| Interior electrical | | --- 100 ---- | 0 | 0 |
| OVERALL | | --- 40 --- | 50 | 10 |

The CM took an active lead in organizing construction. Clients worked as a team on one house, then individually on the others. One client was very slow and had an alcohol problem - this was overcome by the CM who threatened to "fire" the client if he didn't improve his performance. This ingenious method worked well.

## 7. Construction Quality

Construction quality was generally good, reflecting the greater skill and smaller workload of this CM. Two units displayed evidence of ice damming along roof edges, indicating that insulation is probably poorly installed in these areas.

The lack of a central air exchange system is a cause for future concern, since clients are unlikely to use the manually operated kitchen or bathroom fans. No make-up air is provided for the wood stoves, which may or may not present a problem, depending on the leakiness of the building envelope.

## 9. Costs

Although the Sheshastshit project is not a separate project in budgetary terms, separate costs are shown below. Where direct project overheads have not been identified, they have been prorated according to the number of houses.

**Table 2. Committed And Final Project Costs (9 Houses)**

| | Initial (5 units) | Final (est) (4 houses) | Final % |
|---|---|---|---|
| pre-dev. expenses | 2350 | 150 | 0.1 |
| land | 5000 | 2062 | 1.5 |
| fees & permits | 1500 | 204 | 0.1 |
| construction manager | 25000 | 15200 | 11.0 |
| construction manager exp. | 400 | 0 | 0 |
| tools | 500 | 154 | 0.1 |
| materials package | 150000 | 111190 | 80.8 |
| extra freight costs | 5000 | 2923 | 2.1 |
| equipment rentals | 6500 | 0 | 0 |
| labour contracts | 0 | 1669 | 1.2 |
| miscellaneous | 3750 | 4022 | 2.9 |
| **Total** | **200000** | **137574** | **100.0** |
| Other Contributions: | | | |
| Clients | | 0 | |
| CMHC | | 18770 | |
| Est.Actual Total Cost | | 156344 | |
| Land & Services (Deduct) | | -2431 | |
| **Est.Net Construction Cost** | | **153913** | |

**COST BREAKDOWNS**

| | Project$ | $/unit | Avg.Eq.area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 137574 | 34394 | 969 | 35.49 | 382 |
| Net Constr.Costs | 153913 | 38478 | 969 | 39.71 | 427 |

## Project Report: Preston Project, Nova Scotia

| | |
|---|---|
| Local Office: | Halifax Branch Office |
| CMHC Program Manager: | Doris Maley |
| CMHC Project Officer: | John Healey |
| Construction Manager: | Dave Fram |
| Date visited: | February 5, 1988 |
| Visited by: | Nils Larsson |

### 1. Project Overview

The Preston project is a continuation of a 15-unit commitment made in 1986 to the Preston Area Housing Fund (PAHF), a local RNH delivery agency. Seven units were provided under the 1986 budget, while the remaining eight units are being delivered under the 1987 budget.

Although the CMHC project commitment was obtained earlier in 1987 than for the 1986 Demo project, problems in clearing up land titles and legal judgements against clients resulted in actual construction following a schedule similar to the year before. Legal judgements (due to rent or consumer loan arrears) had to be cleared up for seven of the eight applicants. Delays were so extensive that site work did not begin until October 20, and two of the houses had not yet been started at the time of the site visits (February 5).

Dates of Key Project Events

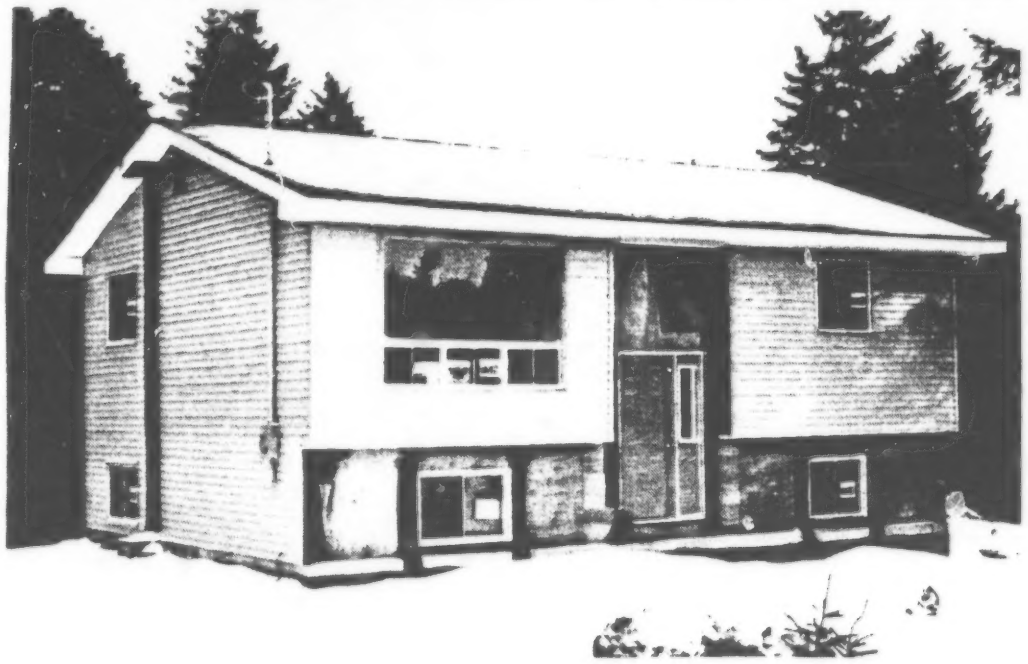
| | |
|---|---|
| Project commitment | Oct. 8 |
| General information sessions | mid-June |
| Design/planning meetings | 2 meetings |
| Bid date | June 28 |
| Tender award | Oct. 12 |
| Work begun on site | Oct. 20 |
| First foundation complete | Oct. 25 |
| First house closed in | Mid November |
| 1st house substant. complete | not yet March 15 |
| First family moved in | not yet |
| Last family moved in | March 31 |
| Work ended on site | April 15 |
| Project closed out | March 31 |

### 2. Project Organization

As in 1986, the project was totally delivered by CMHC, with the exception of participation by the Preston Area Housing Fund (PAHF) in client selection. The construction manager, Dave Fram, is a CMHC inspector who carried out combined construction management and inspection functions. CMHC PD estimates to the end of March are as follows:

Phyllis Farrow, RNH Sr Clerk & Kim Krenzer, clerk, total 25PD for both
Doris Maley, RNH prog.mngr 7PD
John Healey, Chief Insp. 16 PD
Dave Fram, Inspector/CM 80 PD

These PD's have been converted into CMHC project contributions in the Costs section, by taking approximate per-diem charges and applying a mark-up factor of 1.8.



Bilevel unit in Preston -- note the provision for future installtion of chimney and brick facing by clients

### 3. Construction Manager

The CM is a CMHC inspector, an approach that was also used in 1986. This was decided on as a measure to save project funds, since the cost of the CM can be absorbed within on-going office expenses. CMHC staff feel that this is a good arrangement, since an external construction manager would result in such a squeeze on project funding that houses would end up being unacceptably small. Smaller and cheaper designs were, in fact, reviewed and rejected by the community in 1986. Another reason why the Branch favours the involvement of its inspectors is that it gives them direct field experience with the construction process, something which has become almost unknown in recent normal CMHC activities.

While the CM is a CMHC inspector, some CM functions are covered by other CMHC office staff, including the Chief Inspector, the Senior RNH Clerk and the RNH Clerk. Functions included administration of subcontracts, supplier contracts and mortgage administration.

One problem with having an inspector as CM was that he also had other inspection duties to carry out and Mr. Fram estimated that only 50% of his time was available for the project. In hindsight (always 20/20), this stretched his time too thinly, since he had to supervise the construction of eight houses. The difficulty of providing adequate time for so many units was apparent, even though only six houses had been started at the time of the visit. The situation was made more difficult by the relative inexperience of the client households, five of which were mother-led families. These clients required a great deal of outside leadership and training, which was simply not possible to provide within the CM's time constraints. The high rate of volunteer assistance helped to overcome the labour deficit, but the volunteers were not able to provide much on-the-job training.

The result was that several tasks had to be redone by the clients, which was annoying for everyone. On the whole, though, things worked out well, although by a bare margin.

## 4. Community Selection

The area is a predominantly black community and actually consists of three subareas; North Preston, East Preston and Cherrybrook. Although Preston is within commuting distance of the Dartmouth-Halifax urban area, it has a rural and self-contained character. The community is socially cohesive and this has been a factor in the ability of clients to obtain volunteer help, vital in a project where five clients are single mothers.

## 5. Clients

The PAHF took the lead in the client selection process, and this year's clients are from the list developed last year. PAHF officials are of the view that there is a need for up to 25 more demonstration units in the area. The selection criteria used by PAHF in 1987 include the following:

1. client income is within core need
2. client has demonstrated housing need
3. client has, or has access to, expertise and manpower
4. client has land

Criteria 1 and 2 are direct applications of guideline criteria. Criterion 3 is an extension of the CMHC requirement and reflects the fact that although many Preston clients are mother-led families, they all have close relations who are willing and able to build. Criterion 4 has been added by the Halifax Branch as a result of the difficulty experienced last year in building within the Demo budget, where land had to be acquired. It should be noted that the guideline concerning location of Demo units in areas

without RNH units has had to be ignored, since Preston already contains several RNH units.

CMHC's role in the selection process was limited to reviewing the list of proposed clients to ensure that they met the criteria. Two original sites were rejected for technical reasons and one original client was rejected because of several outstanding judgements. There were legal judgements against seven of the eight clients this year, which caused considerable delays in the start of the project.

### 6. Site And Servicing Issues

Considerable budgetary problems were experienced in the 1986 program, because of the need to pay for land and services out of program funds. This year, the ownership of land was established as a selection criterion, and this has eased the burden on the project budget. These measures will result in considerably increased budgetary leeway for the project.

The Demo project is seen by CMHC as being partially responsible for a municipal commitment to install full municipal services this year. This has allowed the use of smaller, "urban county" size lots, rather than the previous rural size lots, and this has reduced the cost for clients and the program. Although municipal services will be installed, it is not certain that the work will take place this year. Temporary measures have therefore been necessary, and one house has been provided with a temporary holding tank, while others have temporary hookups to wells and septic tanks.

### 7. House Designs

As in 1986, there are two designs, both adapted from stock RNH designs. Houses are modest in ground floor area, but both have full basements, which results in a large usable area. One design is a bilevel unit with split entry, with two bedrooms on the ground floor and one, possibly two, on the lower floor. The bungalow design is a straightforward three-bedroom unit. The depth of the bilevel unit has been increased by 6" from the 1986 design, and one closet has been added.

Houses are conventional in construction, with joist floors, 2 x 6 walls and roof trusses (high-heel trusses were ordered but not delivered). Cost limits are a concern, and the standard RNH design has therefore been modified by deleting bedroom and closet doors and floor finishes except in bathroom and kitchen.

Windows are double (non-thermopane) sashless sliders, which allow a relatively high rate of infiltration -- these windows are, however, the norm for the area. Heating is electric baseboard, but the foundation walls and siding have been designed to allow for the later construction of chimneys for wood stoves. Mechanical ventilation of living spaces is not provided for except the manually operated kitchen and bathroom fans. There is no provision for ventilation make-up air. Sheathing has been upgraded from particleboard to plywood.

## 8. Tendering And Materials Packages

Bidders were invited, which is seen by CMHC staff as a distinct advantage in reducing time and complexity. CMHC staff note that this approach would probably not be possible if the program were to be applied more broadly. Road communication is excellent, and this made it possible to deliver materials on an as-needed basis.

## 9. The Construction Process

The construction manager, a CMHC inspector, took the lead role in the construction process. Leadership has been especially important in a project where five clients are mother-led families with little construction skill; but the ability of each family to draw on the help of many volunteers has also been helpful. Clients worked on their own houses, but volunteers tended to work on several houses.

Normal compliance inspections have not been carried out, on the premise that the use of the CMHC Inspector as CM will minimize construction defects. In the case of Preston, however, the handling of six houses (soon to be eight) and the handling of other ongoing inspection duties, have stretched the time of the CM to the limit, and possibly past it. The result has been that he has not always been able to be on the spot when advice was needed, and a number of minor construction deficiencies have resulted (listed in Section 12). These deficiencies are being corrected as they are uncovered, but remedial work tends to be frustrating for both the CM and the client.

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 100 | 0 | 0 |
| Sewage | 0 | 100 | 0 | 0 |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 20 | 80 | 0 |
| Footings/found.walls | 0 | 100 | 0 | 0 |
| Framing & sheathing | 20 | 0 | 30 | 50 |
| Insulation & AVB | 0 | 0 | 60 | 40 |
| Drywall/panelling | 0 | 0 | 40 | 60 |
| Drywall finish | 0 | 0 | 20 | 80 |
| Roofing | 0 | 0 | 40 | 60 |
| Siding | 10 | 0 | 30 | 60 |
| Door/window inst. | 20 | 0 | 30 | 50 |
| Int. Fin, exl.drywall | 0 | 0 | 80 | 20 |
| Cabinetwork | 0 | 0 | 40 | 60 |
| Heating & Ventilation | 0 | 100 | 0 | 0 |
| Plumbing & Fixtures | 0 | 100 | 0 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| **OVERALL** | **10** | **25** | **25** | **40** |

## 10. Project Costs

A summary of project costs at the committed and estimated final stage is presented below:

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 12800 | 12800 | 4 |
| land | 0 | 0 | 0 |
| fees & permits | 3600 | 3600 | 1 |
| construction manager | 0 | 0 | 0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 160000 | 160000 | 50 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 1600 | 1600 | 1 |
| labour contracts | 134800 | 134800 | 41 |
| miscellaneous | 7200 | 19200 | 6 |
| **Total Project Cost** | **320000** | **332000** | **100** |
| **Other Contributions:** | | | |
| Clients - cash | | 1000 | |
| Clients - land value | | 40000 | |
| CMHC | | 33000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 406000 | |
| Land value (deduct) | | -40000 | |
| Value of services (deduct) | | -40400 | |
| **Est.Net Construction Cost** | | **325600** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 332000 | 41500 | 1339 | 30.99 | 334 |
| Net Constr.Costs | 325600 | 40700 | 1339 | 30.40 | 327 |

As in 1986, costs have been saved by using a CMHC inspector as construction manager (estimated equivalent value shown as CMHC contribution below). All clients this year provided their own land, which has also resulted in considerable economies (shown as Client contributions below). Other cost-saving measures include:

- delete doors in bedrooms and closets - 500 per unit
- delete final flooring in bedrooms and living rooms - $1500
- no brick chimney or flue - $1200

These deletions will be added as feasible out of contingency funds until the $41,500 per unit ceiling is reached. It is estimated that the equivalent net construction cost of an equivalent RNH house would be $50,300 for the bungalow unit or about $55,000 for the bilevel.

## 11. Information And Training

Several information sessions were sponsored by PAHF in the Spring. This early start was possible because of the commitment for eight units already made the previous year, and the pre-selection of clients based on the 1986 client selection process.

There was no formal training. Clients were given instruction on-site instruction on air-barrier installations, but other on-site demonstrations were infrequent due to the CM's limited time available for the project. Copies of CMHC publications, including the Wood Frame Construction Handbook, were handed out.

## 12. Construction Quality And Code Compliance

As in 1986, construction quality is generally acceptable, with errors during construction generally being corrected during the process. Site inspection indicated, however, that the limited time available to the CM for supervision probably resulted in an unnecessary number of such quality problems.

Examples include:

- One house was sited so that exterior surface water will drain towards the front door.
- In at least two houses out of six, the main interior bearing walls in the basement had to be rebuilt because of excessive bowing (due to the clients assuming that the concrete floor was dead level).
- Framing on the inside face of exterior basement walls was misplaced in one house visited.
- Waterproof drywall was installed on the wrong wall in one bathroom.
- Siding had to be redone on two houses because of the clients' lack of understanding of the proper sequence of siding application.
- Doors were poorly squared in several units
- The installation of windows, especially junctions with air-vapour barriers, was not up to modern good practice.

In general, the construction quality of these houses is not quite up to the level of most private-sector housing. The most serious problem, however, is due to the design and not defects in workmanship. The houses have electrical baseboard heating, but house ventilation is dependent on manually operated exhaust fans in the bathroom and kitchen. These are not likely to be left on by the clients, and the lack of chimneys or provision for make-up air is likely to cause condensation problems. The condition is not likely to cause immediate problems, but we suggest that efforts be made to provide the modest funding required to improve it. It must be added that this type of problem is common to Maritime housing funded outside of the Demonstration Program.

## 13. Views On The Project

This project has been carried out in a manner very similar to the 1986 project. The main difference this year in project delivery is the higher participation rate of volunteers, which bodes well for the community attitude towards the Program.

The 1986 and 1987 projects have had a considerable impact on the community, and CMHC feels that it is partially responsible for the Municipal committment to install services this year.

For future reference, John Healey feels that a CM who is a CMHC inspector and remains responsible for other inspection duties should handle no less than 3 and no more than 4 houses in order to strike a better balance between economy of scale and better availability.

## Project Report: Sydney, Cape Breton

| | |
|---|---|
| Local Office: | Sydney Local Office |
| CMHC Project Officer: | Jack Miller, Social Housing Manager |
| Construction Manager: | CMHC Inspector and on-site lead hand |
| Date visited: | February, 1988 |
| Visited by: | Nils Larsson |

### 1. Project Overview

The Sydney Demo project consists, as in 1986, of a single house. Work on the house has not begun because of technical and legal difficulties in establishing the exact siting of the unit. Local Office staff realize that more benefit would be obtained from the Program if the recommended multi-unit approach were followed, but given the choice of a single unit or none, they opted to develop experience with the Program.

At the time of the site visit, construction had not yet begun.

### 2. Community And Client Selection

Community selection is somewhat meaningless in the context of a single unit. In addition, the community selected was a by-product of the client selection process.

The Rural and Native Housing Group (RNHGNS) of Nova Scotia was responsible for client selection in 1986 and 1987. The RNGGNS was asked to identify three clients for 1987, two on the mainland and one for Cape Breton. CMHC then verified that the client satisfied the selection criteria as established in the guidelines. The CMHC Sydney office established the same criterion used by the Halifax Office this year, namely that the client should have his own land, so that the limited funds could be used for construction purposes. The selected client, Mr. MacNeil is separated and has one child. He is employed and has an income of $12,480, below the core income threshold of $14,500. He has building skills (estimated as 3 on our 5-point scale) and has several brothers who will help to build the unit.

### 3. Project Organization

The organization of the project will follow the pattern established in 1986: a CMHC inspector will undertake inspection and administrative functions, such as design, tendering, ordering, obtaining permits and issuing subcontracts; while a local contractor will be employed as a lead hand on site.

The on-site CM is a contractor who has recently completed a 20-unit project on the nearby Eskasone Reserve. As previously explained, the CM functions in this project as a lead hand, providing continuous supervision on site. In fact, if the 1986 unit provides a guide, the CM will build much of the house.

**4. Site And Servicing Issues**

The reason for the delay in the 1987 project is the administrative difficulty in severing a building lot from the a large piece of land owned by his brother. This, and the difficulty of finding a source of water on the land, had been overcome at the time of the site visit, and construction was ready to begin. The land is in all other respects very suitable as a building lot.

**5. House Designs**

Last year's unit was a standard RNH bungalow design with a full basement. A smaller unit with a crawl space is being considered for Mr. MacNeill; either a scaled down RNH unit or a variant of a design prepared by a local Coop building supplier. In other respects, standard RNH specifications will be followed - casement thermopane windows and central air exchange units. Construction of the 1987 unit is expected to begin about March 1. The necessity of cold weather construction has led to a decision to pour concrete piers in sonotubes, a move intended to minimize the danger of freezing the bearing soil.

**6. Tendering And Materials Packages**

In 1986, a great deal of effort was made to shop around for the lowest prices. A similar pattern will be followed this year, except that the number of suppliers may be limited to five - still a very comprehensive effort.

**7. The Construction Process**

Although the 1987 unit has not been built, the procedures used in 1986 are expected to be followed. The CM will provide continuous on-site supervision, and will take part in several aspects of construction activity. Foundation and electrical work is subcontracted out. Most work, however, will be carried out by the client and his half-dozen relatives.

**8. Project Costs**

Project costs in 1986 were $38,500. Costs this year are expected to be higher, because of increased legal and water costs, but are still expected to remain below $40,000.

**9. Training And Skills**

The on-site CM will provide on-the-job training.

**10. Construction Quality (Not applicable, as construction has not begun.)**

**11. Views On The Project**

Last year's client and the CMHC Program Officer are both very positive about the program. Mr. Miller would like to see a larger Demo allocation, which would

enable him to involve additional delivery agents (there are seven RNH delivery agents in Cape Breton).

A 1986 Demo unit outside of Sydney, well maintained, but showing evidence of condensation and ventilation problems

**12. 1986 Demo Unit**

The 1986 Demo unit was inspected. It is a standard RNH single floor 3-bedroom design with a full basement. The house appears to be well built, and the client (Mr. Michael Gale) is clearly pleased with his accommodation. Mr. Gale has installed a wood stove in the basement which now provides most of his heating needs.

The unit has experienced major condensation problems, which Mr. Gale has alleviated by cracking open the attic hatch (in the hallway) - not a recommended procedure. Discussion about use of the kitchen and bathroom fans indicate that these are not used except in unusual circumstances.

Discussion with the Program Officer and Inspector indicate that condensation problems are still endemic in the area. Field reports of other RNH units were inspected which reinforced this view. The Office is attempting to deal with the problem by specifying high quality windows (thermopane awning type), but the issue of ventilation has not yet been fully addressed. Heat recovery ventilators are too expensive for RNH or Demo budgets, but steps are planned to provide air exchangers in future units.

## Project Report: New Brunswick

| | |
|---|---|
| Office: | Fredericton |
| CMHC Project Officer: | Nancy Lange |
| Construction Manager: | Jeannot Gionnet |
| Date of visit: | February 4, 1988 |
| Visited by: | Michael Pine |

### 1. Project Overview.

Following the successful pattern adopted in 1987, the project is scattered in rural areas throughout the province. The main occupations tend to be seasonal and include work in the forest and lumber industries, the fishery and some mining. Because of the scattered nature of the project dates vary; key dates include the following;

| | |
|---|---|
| Community info. sessions | May/June 1987 |
| Project committed | June 1987 |
| Materials contract awarded | August 1987 |
| Work begins on first site | July 1987 |
| First family moves in | November 1987 |
| Last family will move in | March 1988 * |
| Work will end on site | March 1988 * |
| Project will be closed out | March 1988 * |

* Incomplete at time of interview

### 2. Community Selection And Clients

Selection was not by community, but according to eligible clients. The New Brunswick Aboriginal Peoples Council selected two of the six clients. Through the RNH program people in greatest need were readily identified and the remaining clients were chosen from this list. Two people chosen initially were unable to proceed and had to be replaced by others. An additional house was allocated to New Brunswick late in the process, but there was no difficulty in finding a client.

The selected clients were;

| Name/ID | Adults | Children | Former Accommodation |
|---|---|---|---|
| A | 2 | 2 | Old Mobile Home |
| B | 2 | | Converted summer cottage |
| C | 2 | 2 | 16x20 ft single room shack |
| D | 2 | 1 | Old (leaning) farmhouse |
| E | 2 | 2 | Old and decayed farmhouse. |
| F | 2 | 2 | Rented old shack. |

Clients had been in touch with the Provincial housing agency but had given up hope of obtaining a house through this route, which appears to be slow.

The two-storey house was designed for a client who lives on a farm and needs the extra storage space. The lower house is the standard three-bedroom unit for other locations.

### 3. Project Organization

This project was largely left in the hands of the construction manager, who had a record of having done a good job in the 1986 Program. Mr. Gionnet is highly skilled in construction techniques and theory and he has had a number of years as a lecturer in building technology in northern New Brunswick and for some years was employed by CMHC.

### 4. Site And Servicing Issues

Three of the six clients had their own land. In one case there was no clear title, even though the family had occupied a house on the land for many years, and it was necessary to find them a new lot. The Corporation ended up buying four lots for around $3000 to $5000 each although one, which included a well and septic tank, cost $7500. All houses are serviced by wells and septic tanks

None of the sites presented particular problems, although one (at Woodstock) has a precipitous driveway that may cause the owner some problems in the winter.

### 5. House Designs

Five of the clients chose a very simple design that originated with the Construction Manager, and whose main feature is a long room across the front of the house that contains the kitchen, dining and living areas, either with or without minor separations between the different areas as the client desires. All five clients stressed that it suited their way of life, which is communal by inclination.

Four of the houses had three bedrooms, while one family had opted for a slightly smaller variation with two bedrooms. The sixth family chose an entirely different design. They live on a farm and obtain some of their living off the land; the house has a basement which was constructed at very little extra cost and which is required for the storage of farm produce. The roof of the house employs rafters, rather than trusses, and this has proved to be a slight economy.

Throughout the process the Construction Manager worked closely with the clients and each house has minor planning differences to suit the family, and to accommodate the major equipment or layout for furniture.

The construction system of these houses varies, since the Construction Manager deliberately changed the wall composition in order to examine costs and ease of assembly (the results cannot be given here as the final construction and accounting is incomplete). Five of the houses have 2"x 6" framing, with R20 batt insulation; on the outside they have 1" rigid insulation which is in turn covered with Tyvek air barrier. Where the client has chosen wood shingles as a finish, they are laid on a sheathing of tongue and grooved boarding (slightly cheaper than plywood in this area) otherwise vinyl siding is laid on strapping.

One house has 2"x 4" framing with R12 insulation, and 3" horizontal strapping with R10 insulation. In this case the air/vapour barrier is on the inner face of the wall

rather than between the strapping and the framing (where it might be expected) since there is not two-thirds of the insulation on the outside.

The poured footings and block foundation walls were constructed by sub-tradesmen to ensure that there was good quality workmanship in this critical area. (this technique has been widely used in these projects, although the formwork for the poured footings is often constructed by the client) The heated crawl spaces are 2'-0" high (4'-0" in one case) and these are all insulated with 2" rigid insulation. This is on the inside except for a couple of cases, including the single basement where the client stores perishable goods and likes the idea of the basement wall forming a heat sink.

**6. Tendering And Materials Package.**

The materials package was tendered on a bill of quantities, and sent out to local suppliers. One house plan was submitted to Kent Homes (Nova Scotia) and their price was accepted. The framing was delivered in 8'-0" sections and was quickly assembled. Excavation, wells, septic tanks and tile beds, footings and foundations, electrical installations, plumbing were done by sub-contract, as were most of the kitchen cabinets and much of the drywall finishing.

The Construction Manager made one set of kitchen cabinets as a (very inexpensive) sub-contractor. Most families agreed that they were too inexperienced to do the drywall finishing and make a good job of it (other projects where the clients have done this work themselves have produced very mixed, and rather awful, results particularly where there is a high gloss paint finish).

Only one client was doing his own drywall finishing, and although it was a good job, it was going very slowly -- the client wished he had also used a sub-contractor.

**7. The Construction Process.**

Client families all reported that there were few problems with construction, and all were highly appreciative of the work of the Construction and Project Managers, who were available as the work required. Because of the scattered nature of the project, the client families did not work together, but there appeared to be no lack of volunteer help. All families had adequate power and hand tools, although a transit level was purchased and used by the Construction Manager rather than hiring someone to do the setting out and surveying.

There was no problem with materials storage as goods were delivered on demand. There were three compliance inspections by CMHC, although these were perhaps formalities since the Construction Manager had worked with CMHC in this field and the quality of his work was known.

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approx. Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 100 | 0 | 0 |
| Sewage | 0 | 100 | 0 | 0 |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 0 | 60 | 40 | 0 |
| Framing & sheathing | 0 | 0 | 100 | 0 |
| Insulation & AVB | 0 | 0 | 100 | 0 |
| Drywall/panelling | 0 | 0 | 100 | 0 |
| Drywall finish | 0 | 90 | 10 | 0 |
| Roofing | 0 | 0 | 100 | 0 |
| Siding | 0 | 0 | 100 | 0 |
| Door/window inst. | 0 | 0 | 100 | 0 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 0 | 100 | 0 | 0 |
| Heating & Ventilation | 0 | 50 | 50 | 0 |
| Plumbing & Fixtures | 0 | 100 | 0 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| Other- Site clearance | 0 | 0 | 100 | 0 |
| **OVERALL** | **0** | **50** | **50** | **0** |

## 8. Project Costs

The following table provides a breakdown of costs at the initial Commitment Stage and as estimated for the final costs:

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 0 | 6600 | 3.0 |
| land | 0 | 1570 | 0.7 |
| fees & permits | 0 | 75 | 0.0 |
| construction manager | 0 | 17335 | 7.8 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 0 | 91500 | 41.3 |
| extra freight costs | 0 | 1800 | 0.8 |
| equipment rentals | 0 | 3150 | 1.4 |
| labour contracts | 0 | 77250 | 34.9 |
| miscellaneous | 0 | 22290 | 10.1 |
| **Total Project Cost** | **0** | **221570** | **100.0** |
| **Other Contributions:** | | | |
| Clients | | 10000 | |
| CMHC | | 24100 | |
| Other | | 0 | |
| Actual Total Cost | | 255670 | |
| Land (deduct) | | -25700 | |
| Services (deduct) | | -40400 | |
| **Est.Net Construction Cost** | | **189570** | |

**Cost Breakdowns**

| | Project$ | $/unit | avg.eq.area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 221570 | 36928 | 1021 | 36.17 | 389 |
| Net Constr.Costs | 189570 | 31595 | 1021 | 30.95 | 333 |

The net construction cost of this project is remarkably low, despite the scattered location of the houses.

**9. Training And Skills.**

There was a variety of skills among the clients varying from professional to fully unskilled. The Construction Manager was able to provide instruction on the site, and no problems were encountered due to the inability of people to understand the principles of construction.

**10. Construction Quality And Code Compliance.**

The construction quality is uniformly excellent, and all code requirements have been met.

**11. Views On The Project**

In spite of the dispersed nature of this project, the construction manager was able to maintain a high level of production and quality. New Brunswick is in most respects an urbanized province and this helped to reduce the cost and difficulties of carrying out the work.

The high cost of CMHC manpower contributions was due to the scattered nature of the project, which led to a great deal of travel time.

## Project Report: Latuque, Québec

| | |
|---|---|
| Local Office: | Laval |
| CMHC Program Officer: | Jocelyn Bigras |
| CMHC Inspector/Project Officer: | Michel Desbiens |
| Construction Manager: | Noel Vézina |
| Date visited: | February, 1988 |
| Visited by: | Dominique Thériault |

### 1. Project Overview

La Croche and La Bostonnais are within fifteen kilometers of La Tuque. The greater community population numbers about 5,000 but is divided into a number of very small communities each with its own Mayor. La Croche with its 520 residents and La Bostonnais with its 479 residents are such communities. Both project communities depend largely on La Tuque for significant amenities.

The only significant source of employment is the CIP paper mill. The supporting forestry industry employs seasonally and casually as well. There is a significant Méetis population and a shifting off-reserve Native population. The region appears to have chronic unemployment problems. The existing housing stock varies from comparable to dismal. New housing is equipped generally with electric radiant heating; wood burning heating is the rule for otherwise.

The project consists of five three bedroom bungalows over full basements. Several client households have joined the two small bedrooms into one larger one and plan on partitioning the basement to add bedrooms when the children are older. The houses are conventional wood frame structures with basements of poured-in-place concrete.

Four units are in La Bostonnais. They are adjacent to one another along a dirt road, between a forest and the La Bostonnais River. The fifth unit is in a residential area of La Croche where trailer homes are common and municipal water is available.

Key dates include the following:

| | |
|---|---|
| House design finalised: | July 1987 |
| Materials package tender and award: | August 1987 |
| First foundation complete: | September 1987 |
| First and last house closed in: | November 1987 |
| First family moves in: | December 1987 |
| Work substantially ended on site: | March 1988 |
| Project closed out: | March 1988 |

## 2. Community Selection

As in all of Québec province, Local Offices are directed to obtain candidate communities and clients through the Waskahegen, an organised off-reserve Native and Méetis organisation.

The Waskahegen had to be hounded for a community and list of candidates. The list of twenty four candidates from the La Tuque region was submitted in May, but contained fifteen applicants who were disqualified by their high incomes alone. There was doubt as to whether qualified candidates could be obtained for the region and the Waskahegen was called in to clarify their performance.

As the client selection was finalised in July, the Local Office felt that the mayors of various small communities in the region could be approached. Several expressed interest and finally the communities where affordable land could be found were chosen.

The criterion of community isolation and remoteness applies here in the sense that the region suffers from limited economic opportunity. As a consequence there is a considerable amount of sub-standard housing. The situation persists beyond the modest presence of Société d'Habitation du Québec rental housing. Building supplies and specialised trades are locally available though the latter are not in plentiful supply. For reasons of land use and environmental conservation however, land prices tend to be high and inexpensive accessible properties are difficult to find.

No current CMHC housing programme initiatives exist in the La Tuque area.

## 3. Clients

A candidate evaluation chart was developed by the Local Office and used in the course of interviews. The Project Officer and Construction Manager interviewed the individual candidates. Criteria used include: size of household, income, liquidity, availability for work, capacity to perform, experience, particular expertise. Reliance was placed on the Construction Manager's knowledge of local personalities. All candidate homes or living quarters were visited.

As construction began, one client lost his nerve. Another client returned to his Reserve. The first case is tragic as there were seven young children involved. However, both parents were serious alcoholics and it might have been optimistic to think that they would carry it through. Both drop-out client households were immediately replaced by runner-up applicants.

One client household consists of a mother of three. Local Office felt that she could perform because of her experience of construction gained from her father, a retired building contractor. At least one head of family is functionally illiterate. Another client has a problem with alcohol, but his extended family of four children, including an adolescent single mother and two nephews won his household participation in the Programme.

All heads of households are on the welfare rolls but two: one is currently unemployed, the other holds a full time job with a Native organisation. Where a household consisted of a married couple, the house was put in both their joint names.

**Selected client households include:**

| Name | Adults | Children |
|---|---|---|
| A | 2 | 1 |
| B | 2 | 3 |
| C | 1 | 3 |
| D | 2 | 4 + 3 |
| E | 2 | 4 |

Existing housing conditions included: expensive to rent or to heat, cold and drafty, lack of privacy, unsanitary, crowded, leaky roofing. One Métis client mentioned that there is noticeable racism in the region which affected her ability to house herself properly. When asked what they would have done to improve their housing conditions, most clients had no hopeful prospects.

**4. Project Organisation**

At Programme inception no Project Officers were available in the Local Office. An ex-employee was hired on contract to perform Programme Administration functions. Files were set-up and a client selection questionnaire and method of evaluation developed. When the contract ended, the Chief Inspector combined Project Officer and Inspector duties.

The Chief Inspector directed the house design selection process and the Local Office produced a bill of materials and set of dimensionned drawings. The Chief Inspector and the Construction Manager evaluated material package supplier bids and the Construction Manager shopped for a plumbing package, roof truss and electrical contract prices.

Once construction began, project administration duties were shared by the Chief Inspector and the Social Programs Director. The Inspector performed all field work and the Social Programs Director performed office work.

This project benefited from a special opportunity. CMHC and the Construction Manager arranged to bring to the project a practical carpentry course sponsored by the school board. Clients wishing to participate could get credit for their time and experience on site, applied towards a recognised 600 hour course in carpentry. The course includes a class on construction safety and provides safety boots and a hard hat. It supplements the Construction Manager's fee. Finally, students already enrolled in the course could use the project to obtain practical experience. The school board arranges for a wage to be paid to its participating students.

Local Office conducted enquiries in La Tuque in order to find a local person. Referrals led to Noel Vézina, retired builder and carpentry teacher at "Le Centre de formation professionnelle de Haute Mauricie/Bois Francs". Mr. Vezina had construction supervision experience in Native Reserves and many of his students at the school are Native or Métis. As all clients would be Meétis or off-reserve Natives, and most could be poor in construction skills, Mr. Vezina seemed to satisfy the most important Construction Manager selection criteria. In hiring Mr. Vezina, Local Office agreed to participate in the carpentry course, as described above.

A typical three-bedroom unit in the Latuque project. Note the covered porch and the large windows.

Although the two clients interviewed were positive about the CM's availability and helpfulness, there may be reservations about his management abilities; mainly relating to the poor labour participation of the clients. Most of the work on this project was, in fact, carried out by a combination of the CM, paid subtrades or the "volunteer" students, who were also paid. This arrangement does not reflect the most important objective of the Program, which is to have clients build their own houses.

## 5. Site and Servicing Issues

Lots affordable in Programme terms are difficult to find in the La Tuque area. Land that is for sale may be zoned "agricultural", and may need access roads, wells and septic fields. Serviced land can be found but at over $10,000 per lot.

Municipalities were not particularly helpful in the search for lots. Finally, one client found her own lot: hence the one unit in a residential area of La Croche, where trailer homes are common. Because of the client's experience in construction, the Project Officer/Inspector and the Construction Manager felt that she could manage the work in relative isolation from the other units.

The La Croche lots receive municipal water but no sewage service. Two lots of 90'x100' were therefore purchased at $3,000 each to make room for a proper septic field but the house had to be placed so that one lot could be released back to the Municipality when sewage service becomes available.

The Construction Manager's brother owns land in the La Bostonnais municipality. It is a very scenic and clearly rural area, without any particular concentration of housing, nor identifiable centre. The Project Officer had to carry out extensive negotiations for the severance of proper sized lots, since the available land is zoned "agricultural" and the owner wanted to sell a larger parcel than required.

The four remaining project units were thus located in La Bostonnais, side by side, along a dirt road, with forested land across the road and the La Bostonnais river beyond the back yard. The lots of 164'x218' required wells and septic fields, which had not been specifically anticipated in the budget. Although neighbouring houses had well depths of about 35', water was only found at 260' for an extra $5,390.

For purposes of facilitating material distribution and handling between the units at La Bostonnais, a common driveway was built, in lay-by fashion, parallel to the dirt road and in the front yard of the four houses. At least one of the clients has expressed fear should the driveway remain, since it may present a danger to children playing in the front of the houses. Unfortunately, it will up to the clients to build individual driveways.

## 6. House Designs

The Local Office surveyed prefabricated house catalogues for easy to build plans. In July, one such plan was drafted to scale and dimensioned for construction.

The prototypical 38' by 26' bungalow includes three bedrooms, one bathroom, a front entrance and split level back entrance, a kitchen-dining area open to the living area, a front gallery and a full basement. The basement is equipped with windows at the rear where it is suitable for sleeping accommodation expansion. Provision for laundry is in the basement. The gallery cuts a 4'x 19' rectangle out of the plan.

Client participation in design was generally limited to a choice of colours and to the form of dividing walls and guard rails. The La Croche client suggested a change in the basement stair which reduced its impact on the ground floor and eliminated the

winders. Her suggestion was adopted on all houses. Another client enlarged the bathroom at the expense of the adjoining bedroom in order to incorporate the laundry. Both of these clients combined the two small bedrooms into a single larger room.

Exterior wall construction is R20 glass fibre batt insulated and framed with 2 x 6 studs. Cross strapping is used on the inside for gypsum board installation. This device allows the foil vapour barrier to reflect heat back into the house as well as protects it from puncture. Cross-strapping on the outside is placed diagonally to allow for 24" spacing on the 2 x 6 studs.

Basement wall construction is poured-in-place concrete. It was intended to be insulated with glass fibre batts fitted to half height in 2 x 3 stud framing; funds were cut. The concrete floor slab is floated. Steel posts hold up a central load bearing beam in half the basement. A 2 x 6 stud load bearing wall supports the floor int he other half of the basement. Prefabricated roof trusses are used throughout. Ceiling insulation is R32 glass fibre batt. The intention is to install gable end grilles to supplement the front and back perforated eaves.

The front windows are vinyl sash, double, sliding units. The side, rear and basement windows are wood casements. Window frames are made of wood, vinyl clad on the exterior. Exterior doors are insulated steel frame units pre-mounted in their wood frames, with integral and thermally broken aluminum thresholds. Exterior wall cladding is coated hardboard, vertical panel on the gables, ship-lap everywhere else. Aluminum is used for the soffit and fascia.

An insulated flue is installed in all units for wood burning heat. Wood burning stoves were supplied to all the units. (These may have to be returned unless client households can pay for them, as any Québec region Demonstration Programme funds unspent early in 1988 were diverted to the Val D'Or Local Office project). The primary heating system used throughout is electric radiant heat. The bathroom can be ventilated through its window. No mechanical kitchen exhaust ventilation is funded by the programme. Neither is there provision for clothes dryer ventilation. No floor covering is funded.

It was pointed out that the plan could be improved by moving the back entrance to the side and placing the bathroom and kitchen plumbing back-to-back. The same could achieved by moving the back entrance to the corner, thus retaining the split level entrance. Another suggestion was that the porch be built out and the area it presently occupies incorporated to the interior.

### 7. Tendering and Materials Package

Tender was based on measured drawings and a bill of materials developed by the Local Office with material standard references. The regional directory of material suppliers provided five or six potential suppliers who were invited to bid. The invitations were supplemented with an advertisement in the local newspaper. There were three responses. The Project Officer/Inspector and the Construction Manager evaluated the submissions. The Construction Manager shopped around for better roof truss and

plumbing supplies prices. He also invited prices from electrical contractors. The lowest bidder was chosen, as a rule. All suppliers and contractors were local.

Materials were delivered to the sites on a weekly basis and as the Construction Manager called. Until the houses were enclosed, a tarpaulin was placed over the week's stockpile outside. Thereafter, material stocks were stored inside houses.

## 8. Construction Process

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approx. Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 100 | 0 | 0 |
| Sewage | 0 | 95 | 5 | 0 |
| Electrical hookup | 0 | Hydro | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 0 | 100 | 0 | 0 |
| Framing & sheathing | 40 | 0 | 60 | 0 |
| Insulation & AVB | 0 | 0 | 50 | 50 |
| Drywall/panelling | 25 | 0 | 25 | 50 |
| Drywall finish | 90 | 0 | 5 | 5 |
| Roofing | 20 | 0 | 60 | 20 |
| Siding | 25 | 0 | 25 | 50 |
| Door/window inst. | 50 | 0 | 25 | 25 |
| Int. Fin, exl.drywall | 30 | 0 | 35 | 35 |
| Cabinetwork | 0 | 100 | 0 | 0 |
| Heating & Ventilation | 0 | 0 | 100 | 0 |
| Plumbing & Fixtures | 50 | 0 | 40 | 10 |
| Interior electrical | 0 | 90 | 10 | 0 |
| **Overall** | **30** | **20** | **30** | **20** |

A contractor performed the excavation, formwork and poured-in-place concrete foundations and basement slab. The first foundation was done in La Croche. All clients attended a construction safety course. The Construction Manager then organised the client households into a team for purposes of erecting the frame and enclosing each house. The installation of the five septic fields and the four wells was contracted out. Rough grading was performed as part of backfilling.

At this point it appears that the Construction Manager almost abandoned the La Croche site and concentrated on the La Bostonnais units. This may be testimony to the abilities of the La Croche client and her volunteers as hers was the first household to move in, almost six weeks ahead of the next.

Client households and students performed the insulation and vapour barrier work under the guidance of the Construction Manager. At this point it appears that the La Bostonnais clients' participation in the work began to dwindle. The Construction Manager became more involved physically with the installation of gypsum board

and planned on executing all taping and plastering himself, with perhaps the participation of his students.

The cabinetry supplier installed the cabinets himself. The Construction Manager set out the plumbing and left it to individual households or students to install. Painting and wood trim was left to participating individual households with the exception of two. The first client had been absent from work except for the first two weeks and was known to be spending his days in bars. The Construction Manager and his students planned on completing the absentee's house nevertheless. The other client held a full time job and could only put in evenings. The students helped with the wood trim in his house.

As previously mentioned, the Table indicates that the clients actually carried out little of the construction on their own houses; and the "volunteers" were actually paid students.

**9. Training And Skills**

The Construction Manager estimates that all clients but two had few skills at project onset. These two he also estimates learned little from the experience. One of the two is the La Croche client, whom apparently he left to her own devices early on. The other only worked the first two weeks.

One of the unskilled clients apparently failed to improve. He is illiterate and cannot read a measuring tape nor understand theoretical explanations. There is disagreement between him and the Construction Manager as to whether he is lazy or needs more guidance. However, this client household is the second to move in. The two remaining clients were estimated to have learned so much as to be employable in the construction industry.

With respect to the accredited carpentry course the employed client could not fulfill the participation requirements. Of the four remaining, only one plans on pursuing the course beyond the completion of his house. He is now considered the most skilled participant. However, the La Croche client's boy friend registered and plans to pursue the course to completion.

**10. Construction Quality And Code Compliance**

Generally, the construction quality of all units meets or exceeds that of local housing. Some building code violations and deficiencies exists however and include the following, found in some or all units. Concrete form tie holes, basement window and door openings need to be sealed on the exterior. In the case of the later, a gap of over an inch exists and the glass fibre insulation therein is exposed to the elements. Some formwork ties still stick out of the basement walls and present a potential hazard.

Inside, main floor beams are spliced at mid-points between supports. Some telepost column top plates are placed on the diagonal to provide full beam width support. Cross-bridging is missing. In one case, joist are notched from the underside to

make way for pipes. Studs are not doubled at openings in the basement load bearing wall and the lintels are held only by nails in shear.

The basement wall should be insulated and a vapour barrier installed. The attic access trap is still open in several units' ceiling. Some plumbing pipes are bent into position. The building paper is installed vertically. Some cladding and gable ventilation grilles are missing.

Interior wood surfaces are left unfinished in at least one unit. Most wood casement windows show serious water staining due to high humidity levels in the houses and failure to seal the wood.

## 11. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 6700 | 4774 | 2.5 |
| land | 12600 | 12600 | 6.6 |
| fees & permits | 2625 | 3451 | 1.8 |
| construction manager | 15000 | 15000 | 7.9 |
| construction manager exp. | 1500 | 25 | 0 |
| tools | 830 | 0 | 0 |
| materials package | 104785 | 98000 | 51.6 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 500 | 0 | 0 |
| labour contracts | 31065 | 55610 | 29.3 |
| miscellaneous | 19395 | 401 | 0.2 |
| **Total Project Cost** | **195000** | **189861** | **100.0** |
| Other Contributions: | | | |
| Clients | | 0 | |
| CMHC | | 25500 | |
| Other (subsidies for students) | | | |
| Est.Actual Total Cost | | 215361 | |
| Land (deduct) | | -12600 | |
| Services( deduct) | | -18570 | |
| **Est.Net Construction Cost** | | **184191** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 189861 | 37972 | 1368 | 27.76 | 299 |
| Net Constr.Costs | 184191 | 36838 | 1368 | 26.93 | 290 |

## 12. Views On The Project

The houses were supplied with flues, but wood burning stoves were not supplied. This is unfortunate, since this project is under budget and is situated in a major wood producing region.

It is apparent from the Local Office's experience that staffing the Programme in order to expedite construction start can be tricky. Other offices delayed their project

rather than hire someone on contract as this Local Office did. The hiring produced thirty man-days of work which would otherwise have been delayed or not fully performed.

In our opinion, the accredited carpentry training programme is a good idea, since it can give unskilled clients an opportunity to earn a better living and new confidence in themselves. In this project, however, the idea interfered with one of the main objectives of the Program. If tried again, all clients should be obliged to actively participate and advised accordingly at the time of interview. Otherwise, regular student participation can be used to substitute for client involvement, as was the case here. In such circumstances, the pride of achievement through sweat equity which the RNH Demonstration Programme offers is lost.

## Project Report: Letang, Québec

| | |
|---|---|
| Local Office: | Val d'Or |
| CMHC Manager/Project Officer: | Michel Maes |
| CMHC Chief Inspector: | Yves Barbe |
| Construction Manager: | Benot Guenette |

### 1. Project Overview

Letang is in Témiscaming county, four hours of sometimes treacherous road from Val D'Or or 350 kilometres west of Val D'Or and 100 kilometres east of North Bay. The town of Témiscaming is one kilometre east and the entire community numbers about 2,500 residents.

The only significant source of employment is in the regional wood pulp factory. The supporting forestry industry employs seasonally and casually as well. There is a significant Métis population. Many inhabitants of the region are unilingual anglophone as would be expected because of the proximity to Ontario. The project community depends largely on Témiscaming for significant amenities. Letang has a gas station and 'dépanneur' store and two hotels with restaurants.

The existing Letang housing stock is generally new and comparable to that of the project. Electric radiant heating is usual. The project consists of five three bedroom bungalows over full basements. The houses are conventional wood frame structures. The basement foundation is poured-in-place concrete. All units benefit from municipal water and sewage services.

Key dates include the following:

| | |
|---|---|
| Construction Manager found: | May 1987 |
| House design available: | July 1987 |
| Applicant interviews (for Letang): | August 1987 |
| materials package tender and award: | September 1987 |
| one client is replaced: | October 1987 |
| First house closed in: | November 1987 |
| Municipal stop work on one house due to siting, issued and revoked: | December 1987 |
| Construction Manager's contract ends: | February 1988 |
| First family moves in: | March 1988 (estimated) |

### 2. Community Selection

As in all of Québec province, Local Offices are directed to obtain candidate communities and clients through the Waskahegen, an organised off-reserve Native and Métis organisation.

The Waskahegen initially presented thirteen applicants for the community of Clericy, about two hundred kilometers from Val D'Or. Six candidates were disqualified before interview and the remaining following interview. Here as elsewhere, the Waskahegen was asked to resubmit. It was pointed out to the organisation that the eligibility

criteria should be observed. The community of Letang and nine new applicants resulted.

The buildings in Letang are new or recent and the Société d'Habitation du Québec is now completing two rental units in the community.

In terms of building supplies and construction tradesmen, Letang does not benefit significantly from its proximity to North Bay. The province of Québec required special permits for out-of-province material deliveries and prohibits out-of-province tradesmen. Building supplies and specialised trades are locally available. There appears to be a small local housing market, judging from the young age of surrounding houses and one clients' assessment of his house's worth ($85,000 versus Local Office's assessment of $50,000).

### 3. Clients

The Project Officer interviewed the individual candidates. Criteria used include: Métis status, income, willingness and availability for the job, households with children. The Project Officer also visited the candidates at home.

During lot clearing, one client never showed up for work. He was immediately replaced by a runner-up applicant. All selected clients live on welfare or, when possible, seasonal work and unemployment insurance. At least one head of family is functionally illiterate. Where a household consisted of a common law couple, the house was put in both their names, jointly. The wife of one married couple asked that the house be put in her name as well.

Selected client households include the following:

| Client | Adults | Children |
|---|---|---|
| A | 2 | 2 |
| B | 2 | 4 |
| C | 2 | 2 |
| D | 2 | 2 |
| E | 2 | 3 |

Existing housing conditions included: expensive to rent or to heat, cold and drafty, lack of privacy, crowded, leaky roofing. When asked what they would have done to improve their housing conditions, most clients had no hopeful prospects.

### 4. Project Organisation

The Local Office manager performed the role of Project Officer as no staff was available for the task. He conducted the candidate interviews, home visits, municipality visits. The Chief Inspector and the Project Officer both visited the proposed lots.

The Project Officer obtained the plans used in its project from the Hull Local Office. The plans and bill of materials were passed onto the Inspector for review and he then made the tender call for the materials package and for the specialised trades.

The Local Office advertised through Québec manpower offices and the Waskahegen for a construction manager. Only one candidate answered. Fortunately, Benot Guenette has experience leading Métis in construction work and is a qualified carpenter. As Mr. Guenette is from Val D'Or, the Chief Inspector is familiar with his work. All interviewed clients expressed respect for the Construction Manager and felt that he taught them much.

Once construction began, project administration duties were generally shared by the Chief Inspector and the Local Officer Manager. The Inspector performed all field work through inspections and the Manager performed office work. The Construction Manager submitted supplier/contractor invoices with written progress reports and directed the work.

In retrospect, the Chief Inspector would have appreciated a site telephone to remain in better contact with the work.

**5. Site And Servicing Issues**

The municipality of Letang helped locate lots for the project. It agreed to extend a residential road for the purpose, beyond a SHQ rental project under construction at the time. It also agreed to provide water and sewage services to the lots but delayed the building permits three weeks. The lots are small and, at the time, were heavily wooded. Clearing and excavation work revealed faults which delayed municipal services installation and construction.

Three lots are slightly up hill on one side of the road. The other two lots are across the road. One of these two was in a depression relative to the road and required extensive landfill. The other also required extensive landfill because bedrock was found about one foot below grade. It is the unit built on this lot which caused trouble with the municipality. The existing neighbour, upon seeing the full basement foundation emerge felt that the new lot would drain onto his and flood his basement.

Although building permits had been issued, the municipality placed an injunction on the work for this unit. The CMHC Chief Inspector had to make a special visit to Letang in order to demonstrate that the unit would be at an elevation no higher than the SHQ units across the road, would correspond to what the municipality considered reasonable, and would not contravene any existing municipal by-law.

Upon excavating for the three units across the road bedrock was found in a corner of each. Local Office decided to blast the two to three feet of rock required to proceed with the full basement. Because a blanket could not be brought in expeditiously, it was decided to use the excavated material (good backfill sand) to dampen the explosion. This material was then re-excavated along with the rock debris. Thus the excavated material was contaminated and new fill had to be brought to the site.

Because of the delay caused by the decision to blast, the foundation contractor's backhoe operators returned to Val D'Or and a credit for the backfill portion of his work issued. Local backhoe operators had to be found. Because of payment troubles with

the SHQ project, they initially wanted pre-payment. The Chief Inspector convinced them to perform the work without pre-payment. However, they would only be hired by the hour, without stipulated price.

The presence of rock and the topography revealed by lot clearing delayed the installation of municipal services. The municipality also had to blast rock and alter its service distribution plans.

### 6. House Designs

Client households were presented a plan selected by the Local Office. Their design participation was restricted to exterior cladding colour, the addition or subtraction of non-load bearing walls and the group selection of cabinet style.

The 38' by 26' bungalow design used for all houses in the project includes three bedrooms, one bathroom, two entrances, a kitchen-dining area open to the living area and a full basement equipped with windows and suitable for living accommodation expansion. Provision for laundry is in the basement.

Three bedroom unit in Letang -- note poured concrete basement, typical of the Quebec projects

Exterior wall construction is R20 glass fibre batt insulated and framed with 2x6 studs. Basement wall construction is poured-in-place concrete, insulated with R7.5

type 2 styrofoam boards, mechanically fixed to half height directly over the concrete. The concrete floor slab is floated. Steel posts hold up a central load bearing beam. Prefabricated roof trusses are used throughout, with special gable units to allow roof space ventilation at the gable end eaves. The ceiling is R20 + R20 glass fibre batt insulated. Aluminum foil is the vapour barrier throughout, except over the rigid insulation where none is planned.

The windows are vinyl sash, double, sliding units. Window frames are made of wood, vinyl clad on the exterior. Exterior doors are insulated core, wood units with steel faces, pre-mounted in their frames. Exterior wall cladding is ship-lap vinyl. Aluminum is used in vertical aluminum gable cladding; perforated soffit and fascia on complete perimeter.

There is no provision for wood burning heat. The heating system used throughout is electric radiant heat. Kitchen and bathroom exhaust ventilation is supplied to all units. There is no provision for clothes dryer ventilation.

## 7. Tendering And Materials Package

The materials package tender was based only on a bill of materials as received from the Hull Local Office in July. All tenders were invited: three from the Témiscaming area, two from Val D'Or and one from Rouyn (west of Val D'Or on the road to Letang). The supply contract was awarded to the lowest bidder, located in Letang.

Unfortunately, the bill of materials was short in terms of lumber, gypsum board, plumbing fittings, cabinetry. Material shortfall was made up locally, through the materials package supplier.

A Témiscaming contractor was approached for the foundation work. His price was $23,500 per foundation. A Val D'Or contractor's price of $11,500 per foundation won him the contract. Blasting and remedial excavation work was contracted to local tradesmen. The electrical contract was awarded to the lowest of three bidders answering to the tender call. The successful contractor is from Ville-Marie, a nearby town, east of Letang on the road to Val D'Or.

Materials were delivered to the site on a house by house basis and as the Construction Manager called. Until the houses were enclosed, materials were stockpiled outside. This presented no loss problems, perhaps because little surplus material was on site at any one time. Thereafter, material stocks were stored inside houses. The only reported instance of breakage occurred during the installation of a window.

## 8. Construction Process

The following table provides a rough approximation of the proportion of on-site labour carried out by various types of participants in the project.

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 10 | 0 | 10 | 80* |
| Sewage | 10 | 0 | 10 | 80* |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 0 | 0 | 0 |
| Footings/found.walls | 0 | 100 | 0 | 0 |
| Framing & sheathing | 0 | 0 | 85 | 15 |
| Insulation & AVB | 0 | 0 | 100 | 0 |
| Drywall/panelling | 0 | 0 | 100 | 0 |
| Drywall finish | 0 | 0 | 100 | 0 |
| Roofing | 15 | 0 | 85 | 0 |
| Siding | 15 | 0 | 85 | 0 |
| Door/window inst. | 100 | 0 | 0 | 0 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 90 | 0 | 10 | 0 |
| Heating/Vent/Electr. | 90 | 0 | 10 | 0 |
| Plumbing & Fixtures | 90 | 0 | 10 | 0 |
| **OVERALL** | **20** | **20** | **50** | **5** |

* by Municipality

The clients cleared the extensive bush which covered the lots, with visits from Local Office. A contractor performed the excavation, formwork and poured-in-place concrete foundations and basement slab. As discussed above, a blasting specialist was called in to aid in completing the full excavation of three units. The original foundation contractor was released in consideration for the delays due to blasting and obtaining new fill. Hourly backhoe operators were called in to backfill the foundations and prevent frost damage. As this activity occurred in November, the grading is very rough. The Construction Manager was not in charge of directing this work.

The Construction Manager organized the client households into a team for purposes of erecting the frame and enclosing each house. Beyond this stage, all clients wanted to work on their particular house. The Construction Manager set-up for each client skilled work such as the construction of stairs and the layout of plumbing. He generally made himself available for guidance in gypsum board installation and taping/plastering, which work the clients performed themselves.

## 9. Training And Skills

The Construction Manager estimates that only one client had few skills at project onset, while the others had at least some skills in construction work. The least skilled and another, he estimates, did not improve themselves in the course of the project. The least skilled is illiterate and lacked the confidence to seek help when he needed it. Apparently, he would stand at the window of his house for hours until the Construction Manager noticed and came to help. The one client who improved the most went from "amateur do-it-yourself" to semi-professional. He was the most energetic and outgoing member of the group.

The Construction Manager regrets that he could not impose team work on the clients for all phases of the work. He is convinced that even the slowest to learn would have benefitted more from it. Also, instead of spending time explaining the same thing over again to each client, he could have spent more time on the details of the work and their explanation.

## 10. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 2150 | 2150 | 0.9 |
| land | 29500 | 35319 | 14.0 |
| fees & permits | 3825 | 4066 | 1.6 |
| construction manager | 8304 | 9757 | 3.9 |
| construction manager exp. | 4800 | 4800 | 1.9 |
| tools | 0 | 430 | 0.1 |
| materials package | 92750 | 94025 | 37.2 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 0 | 9250 | 3.7 |
| labour contracts | 66500 | 79500 | 31.5 |
| miscellaneous | 11871 | 13183 | 5.2 |
| **Total Project Cost** | **219700** | **252480** | **100.0** |
| Other Contributions: | | | |
| Clients | | 200 | |
| CMHC | | 14565 | |
| Munic. water/sewers (est) | | 15000 | |
| Est.Actual Total Cost | | 282245 | |
| Land & Services (Deduct) | | -50319 | |
| **Est.Net Construction Cost** | | **231926** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Cost | 252480 | 50496 | 1482 | 34.07 | 367 |
| Net Constr. Cost | 231926 | 46385 | 1482 | 32.00 | 337 |

## 11. Construction Quality And Code Compliance

Generally, the construction quality of all units meets or exceeds that of local housing. Some building code violations and deficiencies exist however and include the following, found in some or all units.

Concrete basement window openings need to be sealed on the exterior. The rough opening is framed in lumber which remains in place. This aids in squaring window installation. However, pressure treated wood should have been used. Inside, main floor beams are spliced at mid-points between supports. The main beam is also encased in the basement foundation wall with neither air space nor bituminous isolation from the concrete.

The basement wall insulation is inadequate (but all that funds could permit). No vapour barrier is planned for it. Some plumbing pipes are bent into position. Openings in the cladding need to be caulked.

The Construction Manager is likely to be gone before wood trim finishing is appropriate. As in other projects, the trim may be improperly finished and subject to further staining. The exterior doors are warping and the hardware freezing. This could have been prevented if the wood perimeter and hardware boring had been thoroughly sealed with a moisture resistant paint before door installation. The threshold requires finicky trim work to properly finish on the interior and prevent condensation underneath.

**12. Views On The Project**

The level of completeness of this project is surprising given the budget overrun. Other projects sacrificed floor finishes and mechanical ventilation in order to meet budgets. However, this cost overrun exceeds the cost of such sacrifices by an order of magnitude. It is clear to all involved that to proceed with full poured-in-place concrete basements was a mistake, since this decision cost the project almost $48,000 more in foundation work than for the analogous Latuque area project. It must be added, however, that part of the overrun was for the cost of blasting services in from the street.

Although not evident at the time, it is now clear that a more thorough investigation of the lots would have revealed the topography and the need, in one case, for extra fill or for another lot.

The Construction Manager made several recommendations which are reported here.

- The Construction Manager should review and detail the bill of materials before tender. He should coordinate all phases of the work including what is contracted out and be involved in the tendering process of same. (The excavation material was placed in such a way as to interfere with subsequent on-site material storage and handling.)
- Excavation and foundation contracts, if necessary, should place on the contractor the responsibility of obtaining all manpower necessary for all eventualities and to do so in a timely manner.
- Concrete basement formwork should be rented and erected by the clients. Alternatively, pressure treated wood or concrete block foundations should be executed with client labour.
- Taping and plastering should be contracted out as it delays the project up to two weeks, gives much better results and costs less than would be saved by client work.
- All clients should be told from the onset and obliged to work in teams under the Construction Manager's direction and for a set minimum of weekly hours.

Good communication between the clients and the Project Officer or Construction Manager should be an assigned responsibility. For instance, Local Office believed

one of the clients to be delinquent in his work effort because he failed to appear on site in the last three weeks of December. Upon interview, the client explained that his six year old daughter had arthritis in her legs and had to be taken down to a Toronto children's hospital for tests. He also revealed considerable shyness and a reluctance to "make waves". For example, he pointed out an aesthetic deficiency in the way his neighbours were installing their cladding but indicated that he preferred to refuse their help rather than tell them what they should do. Clearly, neither Local Office staff nor the Construction Manager asked the man to explain himself or dealt with the situation. The misunderstanding continues as he is seen by all to be aloof and uncooperative.

The lesson in this rather complicated story is that, if the Demonstration Programme is prepared to admit clients who appear unwilling to speak out, the Project Officer or the Construction Manager must take the responsibility of bringing the person out.

The exterior doors supplied to the project are as comparable in price to the insulated steel doors but of lower quality. They also create preparation and installation difficulties which do not exist with the metal doors. They are not recommended.

## Project Report: Quyon, Québec

| | |
|---|---|
| Responsible Office: | Hull |
| CMHC Project Officer: | Paul Poliquin |
| CMHC Inspector: | Maurice Parent |
| Construction Manager: | Paul Amyotte |
| Date of visit: | February, 1988 |
| Visited by: | Dominique Thériault |

### 1. Project Overview

Quyon is ninety kilometers west of Hull, on the North shore of the Ottawa River. A ferry links Quyon directly to Ontario when the river is navigable. Quyon belongs to the larger municipality of Pontiac. Pontiac includes, since 1976, the original municipalities of Quyon, North and South Onslow, Luskville and Eardley. By virtue of its 446 square kilometers and its 180 kilometers of dirt road, Pontiac is considered rural in the context of the Programme.

Quyon has a population of 1,200, of which at least twenty percent are unemployed. What employment exists is casual or seasonal. Many residents are retired. Half of the population is anglophone, half francophone and ten percent of the francophone population is Métis. Community services include a post office, gas station, restaurant, food store and three hotels/taverns. The existing housing stock varies from comparable to poor. Heating is generally oil or wood fueled.

The project consists of five three bedroom bungalows over full basements. The houses are conventional wood frame structures. The basement foundation is poured-in-place concrete. Three lots are in the town of Quyon and near each other. Two lots are out of town and face each other across a dirt road.

Key dates include the following:

| | |
|---|---|
| applicant interviews: | June 1987 |
| construction begins: | July 1987 |
| first and last house closed in: | August 1987 |
| First and last family moves in: | November 1987 |
| Work substantially ended on site: | December 1987 |
| Project closed out: | January 1988 |

### 2. Community Selection

As in all of Québec province, Local Offices are directed to obtain suggestions for candidate communities and clients through the Waskahegen, an organised off-reserve Native and Métis organisation. The Waskahegen first proposed Rapides-des-Joachims in April, but four of the nine applicants were not available for work at the necessary time and the remaining five were disqualified because of high incomes. As no suitable candidates could be found, Rapides-des-Joachims was eliminated. Local Office asked

the Waskahegen to come up with another suitable community and suitable list of candidates.

By the end of May the Waskahegen proposed Quyon and fourteen candidate households. In June, visits to the majority of clients, the availability of lots and candidate interviews confirmed the acceptability of Quyon under the Program guidelines. The criterion of community isolation or remoteness is not here applied as strenuously as elsewhere. Also, there may be a modest real estate market in the community in the sense that it is viewed as a retirement town and "for sale" signs are visible. Two factors, however, made Quyon an attractive site: reliance on the Waskahegen for community and client selection and the Local Office's 1986 experience.

### 3. Clients

The Project Officer and Construction Manager interviewed the individual candidates. Criteria used included: attitude towards effort and trouble required; availability of volunteer help; construction experience; house construction understanding; better housing need; income inadequacy; children; ability to afford programme housing operation and maintenance.

With his experience in the 1986 Demonstration Programme and his understanding of the leadership and team work required, the Construction Manager helped to identify clients who had desirable aptitudes and attitudes towards work.

All candidate homes or living quarters were visited. Signed income declarations were obtained and credit checks performed. Questions of income eligibility of two households were resolved with a second interview. At least one head of family is functionally illiterate. Existing housing conditions included: expensive to heat, cold and drafty, polluted water supply, crowding, leaky roofing.

Selected client households include:

| Client | Adults | children |
|---|---|---|
| A | 2 | 4 |
| B | 2 | 2 |
| C | 2 | 2 |
| D | 2 | 2 |
| E | 2 | 3 |

### 4. Project Organisation

All programme administration work was performed by the Local Office. However, the Construction Manager was invited to participate in client selection and house plan selection. The Bill of Materials was prepared by the Construction Manager. The tendering process was administered by the Project Officer. Local Office conducted inspections every two weeks. The Project Officer visited the project every other week. During construction, the Construction Manager performed as team leader with emphasis on clients performing the work themselves and in teams organised by himself. Any volunteers during weekdays were fitted to the pattern. The Construction Manager executed work himself only to the extent needed to organise and direct clients.

The Construction Manager lives in the region and has proven himself in the same capacity through the 1986 RNH Demo Project delivered by Hull at Campbell's Bay.

**5. Site And Servicing Issues**

The two lots located out of town are owned by the client households, the Miljour brothers. As they could volunteer for each other's houses and the lots face each other across the road, the separation of these units from the rest was not considered problematic. Existing well and septic services were adopted.

The three town lots receive municipal water and sewage services. The Municipality helped in finding lots. The acquisition of lots was complicated by inflated asking prices: $9,000 to $10,000 for lots worth $6,000 in the market. Finally the material supplier sold two lots to the project and the Project Officer negotiated a third, all for $18,100.

House siting is generally good. However, in one case, the slope is believed to promise water infiltration problems in the basement unless countervailed by proper finish grading.

**6. House Designs**

The Project Officer and the Construction Manager reviewed eight or nine similar sketch design plans developed at the Québec region offices in June. In July, the LO prepared drawings of the selected plan to scale and dimensioned it for construction.

The 38' by 26' bungalow includes three bedrooms, one bathroom, two entrances, a kitchen-dining area open to the living area and a full basement, with windows and suitable for living accommodation expansion. The basement has space for laundry.

Exterior wall construction is R20 glass fibre batt insulated and framed with 2x6 studs. Basement wall construction is poured-in-place concrete, insulated with R12 glass fibre batts fitted to half height in 2x4 stud framing. The concrete floor slab is floated. Steel posts hold up a central load bearing beam. Prefabricated roof trusses are used throughout, with special gable units to allow roof space ventilation at the gable end eaves. The ceiling is R12 + R20 glass fibre batt insulated. Polyethylene sheet of 4 mil thickness used for AVB throughout.

The windows are vinyl sash, double, sliding units. Window frames are made of wood, vinyl clad on the exterior. Exterior doors are insulated steel frame units pre-mounted in their frames, with integral and thermally broken aluminum thresholds. Exterior wall cladding is ship-lap vinyl.

There is no provision for wood burning heat. The heating system used throughout is electric radiant heat. Kitchen and bathroom exhaust fans are installed in all units, but are only provided with manual switches. There is provision for clothes dryer ventilation in the form of a flexible round duct and wall vent.

Client households were presented the plan selected by the Local Office. Their design participation was restricted to exterior cladding colour, the addition or subtrac-

tion of non-load bearing walls, and the contribution of extra fenestration. One client contributed a central vacuum system and gypsum board finish to the exterior basement walls.

A three-bedroom house in Quyon with a full basement. This house replaced a decayed mobile home on the same lot.

## 7. Tendering And Materials Package

The materials package was developed by the Construction Manager from the house plans. Except for interior finishes, it was tendered in the first week of July and the supply contract was awarded ten days later. Interior finishes were tendered early in November. The excavation and formwork contracts were awarded in July; the electrical contract (obligatory in the province of Québec) was awarded in late September; taping and plastering in mid-October.

Supplier bids were invited for the materials package and an advertisement was placed in the newspapers. Specific contractors were invited to submit bids for excavation, formwork, electrical work, taping and plastering. Successful bidders were chosen for service proposed and location as well as for price. Ninety five percent of materials were purchased from local/regional sources.

Material deliveries were made daily, in pace with construction progress until the houses were closed and secure. Afterwards, materials were delivered at the Construc-

tion Manager's request. There are no reported instances of theft or breakage associated with material delivery, storage and handling.

## 8. Construction Process

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approx. Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 10 | 90 | 0 |
| Sewage | 0 | 10 | 90 | 0 |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 0 | 0 | 100 | 0 |
| Framing & sheathing | 0 | 0 | 90 | 10 |
| Insulation & AVB | 0 | 0 | 90 | 10 |
| Drywall/panelling | 0 | 100 | 0 | 0 |
| Drywall finish | 0 | 100 | 0 | 0 |
| Roofing | 0 | 0 | 100 | 0 |
| Siding | 0 | 0 | 90 | 10 |
| Door/window inst. | 0 | 0 | 100 | 0 |
| Int. Fin, exl.drywall | 0 | 0 | 90 | 10 |
| Cabinetwork | 10 | 0 | 90 | 0 |
| Heating & Ventilation | 10 | 0 | 90 | 0 |
| Plumbing & Fixtures | 0 | 0 | 100 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| **OVERALL** | **5** | **35** | **50** | **10** |

CMHC placed considerable emphasis on working in teams. Concrete forms were rented, erected and moved from site to site by the client team as the pouring progressed. The houses were then framed and closed in one by one by the client work team. Individual client household work was allowed for interior finishing work only. On weekends, clients could work on their own houses as well. Most volunteers contributed during weekends. The contracting out of taping and plastering work expedited the project and eliminated a phase of the work which has discouraged clients in other projects. There were no reported problems with sub-trades.

## 9. Training And Skills

All client households except one had adequate construction skills at the time of interviews, and the unskilled client had a brother, also a client, who was deemed capable of compensating for any shortcomings. One client was deemed to be a skilled worker.

The Construction Manager believes that all clients improved their skills and that all but two are now skilled enough for hire. The Construction Manager believes that the clients learned much more from a group organization and that the project benefitted from the efficiency of this method.

All clients overestimated their construction skills before and after the project and all felt that they improved themselves. This expression of confidence is testimony perhaps to the enthusiasm generated by the programme. Most felt that they had learned most from the Construction Manager.

## 10. Construction Quality And Code Compliance

Generally, the construction quality of all units meets or exceeds that of local housing. Some deficiencies exist, however, and include the items listed below. The deficiencies were found in some or all units at the time of inspection; missing or incomplete items are scheduled to be done prior to the project close-out.

Concrete form tie holes and basement window perimeters need to be sealed on the exterior. In the case of the latter, a gap of over an inch exists and the glass fibre insulation therein is exposed to the elements.

- Finish grading is planned at some sites but the dampproofing is not visible above the rough grading (but the LO reports it was done).
- Inside, main floor beams are spliced at mid-points between supports. Telepost column top plates are placed on the diagonal to provide full beam width support. Cross-bridging is missing. Basement stair opening headers are single.
- The basement wall polyethylene vapour barrier is not sealed at the underside of the ground floor, nor at the electric panel power entrance.
- The sewer or septic pipe cleanout was missing at its base in one unit.
- Handrails are missing inside and outside (to be done).
- Interior wood surfaces are not yet sealed or have only a first coat of varnish.

## 11. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est | Final % |
|---|---|---|---|
| pre-dev. expenses | 2625 | 2625 | 1.3 |
| land | 19500 | 19500 | 9.6 |
| fees & permits | 4030 | 4030 | 2.0 |
| construction manager | 14500 | 14500 | 7.2 |
| construction manager exp. | 3000 | 3000 | 1.5 |
| tools | 0 | 0 | 0 |
| materials package | 119205 | 121705 | 60.1 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 6240 | 6240 | 3.1 |
| labour contracts | 27000 | 27000 | 13.3 |
| miscellaneous | 3900 | 3900 | 1.9 |
| **Total Project Cost** | **200000** | **202500** | **100.0** |
| Other Contributions: | | | |
| Clients | | 14930 | |
| CMHC | | 32000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 249430 | |
| Land & Services (Deduct) | | -31100 | |
| **Est.Net Construction Cost** | | **218330** | |

| Cost Breakdowns | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 202500 | 40500 | 1482 | 27.33 | 294 |
| Net Constr.Costs | 218330 | 43666 | 1482 | 29.46 | 317 |

The Cost Breakdown table indicates that net construction costs on a basis of $ per equivalent square feet are exceptionally low -- this probably reflects the use of basements, which are low in marginal cost, but are calculated to add 50% to the useful area of the house.

## 12. Views On The Project

The Quyon project is a success in many respects. Neighbours in the community who originally expressed pessimism are pleasantly surprised.

All units are substantially complete and all client households moved into their homes about four months after project commencement. Although six months of the Construction Manager's time were budgeted; it took five months. It is to the credit of Hull Local Office that the project was begun in the summer, in spite of poor performance by Waskahegen with respect to its original community and candidate submission.

All client households participated in the work to the Construction Manager's satisfaction and all clients grew to respect the Construction Manager. All acquired new skills or improved old ones. They are proud of their achievement. It is to the credit of the Construction Manager and the good choice of candidates made by the Project Officer and the Construction Manager.

To complete the success of this project, all clients should meet with the Construction Manager or CMHC inspector and the Project Officer to discuss the following outstanding items:

- the clients are unused to air tight housing and shun electrical consumption. This combines to create a serious moisture build-up problem which may damage the windows and test the quality of the vapour barrier seal beyond its capacity. Part of the problem is that there is no central air exchange unit, nor is there a dehumidistat control;
- the basement window perimeters must be sealed;
- door, window and electrical meter joints with the cladding should be caulked;

## Project Report: Caramat, Ontario

| | |
|---|---|
| Local Office: | Thunder Bay Local Office. |
| CMHC Project Officer: | Heidi Uhlig |
| CMHC Chief Inspector: | Frank Kipien |
| Construction Manager: | Gilles Belair |
| Date visited: | February, 1988 |
| Visited by: | Dominique Thériault |

### 1. Project Overview

Caramat is in the district of Thunder Bay, fifty-six kilometres northwest of Longlac and a four hour drive north east of Thunder Bay. Its population fluctuates with economic conditions and was estimated in 1985 at 325.

Services include a gas station, restaurant, store, post office and community centre. There is an active Local Services Board which is responsible for municipal services. The nearest significant amenities are at Longlac.

The main sources of employment are the Canadian National Railway, which crosses the community, and forest product companies. In the latter case, temporary layoffs are normal in consideration of weather and forest fires.

Caramat's housing stock is generally very poor. Heating is wood fueled in most houses. The Caramat project consists of two bungalows over crawl spaces. One is a three bedroom unit and the other is an extension of the former into a five bedroom unit.

Pursuant to introduction of the RNH Demonstration Program CMHC has also introduced ERP and RRAP into the community.

Key dates include the following:

| | |
|---|---|
| Public meeting to obtain applicants: | June 1987 |
| applicant interviews: | August 1987 |
| construction begins: | September 1987 |
| first house closed in: | October 1987 |
| Construction Manager's contract ends: | November 1987 |
| First family moves in: | December 1987 |

### 2. Community Selection

Local Office considered several communities for the project. Caramat came recommended by the Ontario Ministry of Housing Community Planning Advisory Branch (CPAB) as a community with some economic prospects. Although some residential land in Caramat is Crown owned, a recent CPAB study of Caramat recommends release of these lands to the Ministry of Natural Resources.

Upon visiting Caramat, the Project Officer found the community leaders to be very interested in helping to deliver the program and any other available housing im-

provement program. They offered to provide very inexpensive room and board for the Construction Manager and help recruit candidates.

### 3. Clients

Pursuant to a public meeting organised by the Caramat Local Services Board, six applications were received. Two were immediately disqualified, and the remaining four candidates were interviewed by the Project Officer and the HDO. During subsequent interviews with the construction manager, two households appeared committed enough to proceed. Through the availability of volunteer help or through construction experience these candidates were considered capable of meeting the challenge, although both were employed by day. One household is native and the other francophone.

Selected client households include:

| Clients | Adults | Children |
|---|---|---|
| A | 2 | 6 |
| B | 2 | 2 |

One household lived in their own house. The house was expensive to heat, too small, and suffered from structural deterioration due to rot. The client's intention was to continue patching as it was all that could be afforded.

The other household lived in accommodation rented through the provision of caretaking services. As the arrangement was not permanent and the house was too small for the large family, the client had obtained a lease on a Crown owned lot where stood a derelict building which was never completed. He had arranged to acquire this building over time and had begun to work on it. It would have taken years and a lot of money to turn the building into a habitable home.

### 4. Project Organisation

Once the project was initiated, the clients selected and the Construction Manager on board, the Project Officer concentrated on administration. The Caramat Local Services Board, a few CMHC Inspector visits and the Construction Manager were called upon to provide feedback on progress.

The Construction Manager obtained estimates and supervised delivery scheduling and execution of the work. He kept a detailed diary which he provided to the Project Officer.

CMHC Inspections were initiated by the Project Officer. Only two inspections occurred and the third was cancelled due to sick leave. The Project Officer had an understanding with the Local Services Board that should the Construction Manager or project need visiting, Local Office would be notified.

The Local Office settled on a Construction Manager who came recommended by a major Thunder Bay construction materials supplier which has a good track record with CMHC. Gilles Belair is a carpenter and has ten years construction supervision

experience. He is also bilingual, which asset was appreciated given the client language situation.

Mr. Belair embarked on this project with a serious hip problem which caused him some pain. He was scheduled to leave the project for surgery on 19 November 1987. His diary bears testimony to the enormous effort he put out towards completion of the two houses. He worked seven days a week from his arrival on site except for one day of rest.

The only reproach one might make is that he had difficulty explaining the work to the one totally unskilled client. He relied on verbal explanations and the client needed graphic demonstration. As a result the client had to redo a lot of work and felt somewhat neglected. The family is native, and the cultural differences may explain some of the problems in communication.

Perhaps because of the short time available and certainly because of the small and sometimes unavailable work force, the Construction Manager executed much of the work himself.

**5. Site and Servicing Issues**

The lots face each other across a street in a Crown Land area. They are thus both used through occupancy permits. However the CPAB recommendation (to the Ministry of Natural Resources to release the land for sale) is likely to take effect.

For budget purposes Local Office relied on the clients' opinion of existing septic and well services. Contingency funds were budgetted to cover such services. Eventually, both lots were assessed to need new septic tanks and fields, and one was found to need a new well.

Throughout the area the soil is sandy, easy to excavate and drains well. There was some clearing to do and an old foundation to backfill. The clients performed this work at their own expense.

There are at least six car wrecks and the derelict building mentioned above on one of the two lots. The owner of the wrecks, who is also the original owner of the building, is supposed to remove them. Title to the building is also supposed to revert to the original owner if the client cannot finish paying for it by April.

The siting of one house places the side door facing dominant winds. For this reason, the client would have preferred the house plan reversed. This reversal would have also made it possible to use the derelict building as a garage without routing the driveway over the septic field.

**6. House Designs**

After discussing options with the clients, the Project Officer selected the H-1 model from stock CMHC RNH designs. The design was discussed with the Construction Manager in terms of ease of construction and functionality. Measured drawings of the standard model were obtained from the Ontario Regional Office. The modifica-

tions which the Project Officer and Construction Manager made to the plan were not drafted up.

The standard 12.7m by 8.2m bungalow includes three bedrooms, one bathroom, two entrances, a kitchen, and a dining area open to the living area. In both houses the ramped side entrance is replaced by steps. The front door opens into a storage/laundry room/vestibule. One house is extended to add two bedrooms and the length is increased to this end by 2.8m. The houses sit on a crawl space.

Three bedroom unit in Caramat with crawl space

Exterior wall construction is R20 glass fibre batt insulated and framed with 2x6 studs. The crawl space is enclosed with cement-asbestos boards nailed onto 2x4 stud framing placed between the peripheral preserved wood foundation posts. Between these 6" posts and on the inside, R7.5 styrofoam boards cover the 2x4 skirt framing. The perimeter of the floor platform is intended to be insulated with glass fibre batts. Polyethylene sheet covers the ground in the crawl space and it is covered with at least 2" of excavation sand. Three beams made of laminated 2x10 lumber run the length of the house and support the platform. The central beam is also supported on preserved wood posts.

Prefabricated roof trusses are used throughout. Each house is fitted with a gable access hatch and ventilation grille. The ceiling is R20 + R20 glass fibre batt insulated.

Polyethylene sheet of 4 mil thickness is the vapour barrier everywhere except in the crawl space, where no vapour barrier is installed.

The windows are vinyl sashed, double, sliding units, except for the living room picture window. It is a wood unit with a central fixed light flanked by two casement windows. Window frames are made of wood. The sliding units are vinyl clad on the exterior. Exterior doors are insulated core, wood steel faced units pre-mounted in their frames. Exterior wall cladding is ship-lap vinyl. Aluminum is used in perforated soffit and fascia on complete perimeter.

Both houses are equipped with insulated flues and have been supplied with air-tight stoves. However, the primary heating system is electric forced air. The furnace is slung from the floor joists in the crawl space. Only wiring is provided for kitchen exhaust ventilation. At project close-out, funds were directed to the installation of clothes dryer ventilation.

Client households' design participation was restricted to choice of exterior cladding colour, roofing shingle colour and, in one case, to the contribution of an extra window. Paint was not provided by the programme. At project close-out, funds were directed to the purchase of finish flooring, which were still required.

## 7. Tendering and Materials Package

The major materials package supplier was invited to bid on the basis of the standard H-1 model drawings and modifications as explained by the Construction Manager. The Thunder Bay supplier thus produced a list of materials. Specific material choices were made by the Construction Manager, with Local Office approval. Single Thunder Bay suppliers were invited to submit their price for plumbing materials and electrical materials packages.

The major materials package supplier was initially selected because of his good track record with CMHC on other programmes. This is the supplier who recommended Gilles Belair for Construction Manager. The supplier coordinated material deliveries from Thunder Bay to Caramat and was noted as being extremely cooperative and helpful. Sundry supplies were bought from Longlac as needed.

It appears that only the supply of septic field gravel benefitted from competitive pricing. The Construction Manager was relied upon to obtain the best price from the chosen suppliers. Septic system and well materials were bought from Geraldton by the Construction Manager. Geraldton is over 2 hours by road from Caramat. The Construction Manager picked up some of these materials himself with use of one client's trailer.

Deliveries were scheduled according to the Construction Manager's needs. More material was delivered than could be immediately consumed because of the considerable distance from Thunder Bay to Caramat. The major supplier thus packaged the goods so that the materials needed first would be first accessible.

Storage was arranged in the garage of the homeowner client. The Construction Manager used his truck to bring materials to the sites as required. There were only two cases of loss. In the first, a roll of polyethylene sheet disappeared. In the second, a sliding window was transported on its side by the client and one of the two panes broke.

**8. Training and Skills**

As previously noted, the Construction Manager instructed the households on an individual basis. He estimates that one household had some construction skills while the other very few. The head of the first, he estimates, progressed to a moderately skilled level and the head of the second learned nothing.

His opinion of the second client reflects, in the writer's opinion, an inability on the Construction Manager's part to communicate effectively with the client. The latter is incapable of understanding abstract explanations, diagrams and basic geometry. Only concrete demonstration communicates. The Construction Manager's compressed schedule and the lack of volunteer help at the other household may explain why this client received less guidance than his personal case may have required. Differences in culture may have contributed to the communications gap.

Nevertheless, the client feels that he learned enormously and would be employable in the construction industry. Paradoxically, the more knowledgeable client feels that he learned practically nothing.

Pursuant to the Construction Manager's departure one inspection was conducted by the Local Office. During that inspection the less knowledgeable household was found to be plastering joints with kitchen utensils and advised on the proper tools and method to use.

**9. Construction Process**

The Construction Manager failed to organise the two households into a team beyond the initial stages although the head of each household took several weeks off work to give the project a good start. This may be due to the fact that one household benefitted from lots of volunteer help while the other did not and that the Construction Manager was reluctant to impose his leadership on the volunteers.

Once the foundation posts were in the ground, the Construction Manager went from one house to the other and each household concentrated on its own building. As the clients needed to return to work, the CM became the prime source of labour. At the time of the Construction Manager's departure, neither exterior cladding nor interior finishes had yet been applied.

The following table shows an approximate breakdown of labour input.

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 10 | 0 | 15 | 75 |
| Water supply | 5 | 0 | 50 | 45 |
| Sewage | 20 | 0 | 30 | 50 |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 0 | 0 | 100 |
| Footings/found.walls | 20 | 0 | 40 | 40 |
| Framing & sheathing | 30 | 0 | 35 | 35 |
| Insulation & AVB | 0 | 0 | 50 | 50 |
| Drywall/panelling | 15 | 0 | 40 | 45 |
| Drywall finish | 10 | 0 | 30 | 60 |
| Roofing | 15 | 0 | 15 | 70 |
| Siding | 0 | 0 | 0 | 0 |
| Door/window inst. | 10 | 0 | 40 | 50 |
| Int. Fin, exl.drywall | 0 | 0 | 0 | 0 |
| Cabinetwork | 65 | 0 | 35 | 0 |
| Heating & Ventilation | 50 | 0 | 50 | 0 |
| Plumbing & Fixtures | 100 | 0 | 0 | 0 |
| Interior electrical | 45 | 0 | 0 | 55 |
| **Overall** | **30** | **5** | **35** | **30** |

## 10. Construction Quality and Code Compliance

Generally, the construction quality of both units meets or exceeds that of local housing. Some building code violations and deficiencies exist however and include the following, found in one or both units.

The first CMHC inspection revealed insufficient floor beam support. The measures taken to add intermediate supports may be inadequate. The posts added rest on the ground and are merely jammed to the underside of the bearing beams with the aid of shims. Given that one client household has every intention to excavate the crawl space and make a basement out of it, questions arise. The other house's crawl space is only accessible from the outside and so is not likely to be visited often enough for fallen or loose intermediate posts to be noticed.

The exterior cladding is only begun on one house. According to the clients, the supplied vinyl cracks readily in the cold. Installation must thus wait for spring and does not benefit from the Construction Manager's supervision. The question also arises as to the suitability of the material selected in terms of longevity.

The fasteners used to fix the cement-asbestos crawl space skirting are nails. These are no washers and the fixing holes were not drilled. As a consequence, the boards were easy to crack or break at edges and corners. There is also no allowance for expansion and contraction. In the case of one house, the cement-asbestos boards were cut to odd widths and result in too many vertical joints.

As interior finishes were left to the clients, the results reflect the client's relative means and skills. The flooring throughout one house was still bare plywood at the time of the writer's visit. Apart from the potential splinter problem, the irregular joints and

gaps trap dirt. The paint here was donated by a benevolent neighbour. In the other house the tub surround was painted gypsum board (though tiling is planned).

As the programme did not provide mechanical ventilation equipment nor dryer ventilation, humidity can be a problem. This is particularly true for the laundry activity as the one house which performed its laundry on the premises the time of the writer's visit had an inordinate humidity problem.

The exterior doors in the humid house are warping and the hardware freezing. This problem is extreme in the case of the door which opens into the laundry room and which is used as the main entrance. This could have been prevented if the wood perimeter and hardware boring had been thoroughly sealed with a moisture resistant paint before door installation.

The threshold supplied with these steel faced, insulated core, wood doors requires finicky trim work to be properly finished on the interior and prevent condensation underneath.

The absence of vapour barrier in the crawl space and of insulation and vapour barrier on the floor platform perimeter is alarming. The furnace is in the basement and thus inevitably heats the space through the uninsulated ducts. The floor above is not insulated. Moisture is thus bound to migrate down from the house or up from the ground.

## 11. Project Costs

**Table 2.Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 100 | 100 | 0.1 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 12000 | 9600 | 11.5 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 64000 | 73565 | 88.3 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 0 | 0 | 0 |
| labour contracts | 0 | 0 | 0 |
| miscellaneous | 7900 | 35 | 0.1 |
| **Total** | **84000** | **83300** | **100.0** |
| Other Contributions: | | | |
| Clients | | 2630 | |
| CMHC | | 29170 | |
| Local Service Board | | 150 | |
| Est.Actual Total Cost | | 115250 | |
| Land & Services (Deduct) | | 0 | |
| **Est.Net Construction Cost** | | **105550** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 84000 | 42000 | 1243 | 33.79 | 364 |
| Net Constr.Costs | 105550 | 52775 | 1243 | 42.46 | 457 |

## 12. Views on the Project

This project would have benefitted from an earlier start, but land questions were being resolved and a search was being made for a CM. In addition, much of July and August was lost to staff vacations. The Thunder Bay Local Office is not exceptional in this regard. One may therefore conclude that staffing arrangements in participating Local Offices should reflect the programme's construction start requirements.

Had the project begun earlier, the Construction Manager would have had more time to spend instructing the clients. They would have participated in the skilled work which he undertook himself. Exterior cladding would have been installed before his departure and winter. Insulation in the basement would have probably been completed at the floor perimeter. Finally, client work would not have caused such hardship.

Although this programme seems to encourage the selection of unemployed clients, there is no reason that the working poor, such as the Thunder Bay households cannot participate competently. Construction quality and completeness has been affected here more by winter conditions and the early departure of the Construction Manager than by the constraints on client time. If anything, the results bear testimony to strong client motivation.

It is unfortunate that floor finishes, paint and clothes dryer ventilation were sacrificed in the effort to fit a two unit project into a budget based on five unit economy of scale. These things could have been funded for well under $3000.

Finally, the exterior doors used in this project should never be used again. They are not inexpensive enough to justify their failure to suit the requirements of the project.

## Project Report: Chetwynd, Ontario

| | |
|---|---|
| Local Office: | North Bay Local Office. |
| CMHC Project Officer: | Leon Levasseur |
| Construction Manager: | Ken White. |
| Date visited: | January 13, 1988 |
| Visited by: | Michael Pine |

### 1. Project Overview.

The small community of Chetwynd is located about 8 km southeast of Burk's Falls (90km south of North Bay), within the municipal boundary of the Township of Armour. The hamlet has a small community centre of its own and this forms the social centre of the 50 to 60 families living within a 5 km radius. Most area families own 10 to 100 acre parcels of land, and do a little mixed farming for their own consumption. Families are in various occupations, mostly casual or seasonal work other than some steady jobs in the town of Burk's Falls.

The Chetwynd project is comprised of three units on separate sites, all located within 2 km of the community centre.

Key dates include the following:

| | |
|---|---|
| Community info. sessions | Oct. 1987 |
| Project committed | Oct. 1987 |
| Work begins on site | Oct. 1987 |
| First family moves in | *Feb/Mar 1988 |
| Last family moves in | *Feb/Mar 1988 |
| Work ends on site | *Mar 1988 |
| Project closed out | *Mar 1988 |

*Estimate only, project not yet complete (13th Jan 1988)

### 2. Project Organization

The project was administered from the North Bay Branch of CMHC. Since the branch had worked successfully with the selected Construction Manager in other projects, the Branch Manager dispensed with a separate Project Officer and did the administration himself.

In his opinion, the amount of work involved in 1988 was 90% less than in 1987 since the bulk of responsibility was transferred to the Construction Manager, who carried the job except for the issuing of cheques, which remained the responsibility of CMHC.

Partly because of a late start, and partly because good prices were obtainable, a local 'shopping' approach was adopted, where the Construction Manager purchased materials and services after checking out the neighbourhood outlets.

The Construction Manager was well known to the North Bay Branch. He is now an employee of the Armour Township, but has built a number of houses as entrepreneur (some of the same design as those selected for the Demonstration project.) He has also been instrumental in delivering the CMHC Rehabilitation program in the Township. Because of this close relationship and trust, the CMHC Branch Manager left a great deal of the work to him.

### 3. Community Selection

This project was committed in mid-October 1987 as a consequence of the Thunder Bay Office releasing three units it had previously been allocated. The Municipality of Armour Township had actively participated in the delivery of RRAP as well as Section 40, and is well aware of the people in need of better housing in the area of its jurisdiction. When approached, the Municipality welcomed the project, and the local MP, Mr. Stan Darling was equally supportive. In the short time available, the Municipality promised to be the best location for the project and there was no shortage of qualifying families. The area is rural, but there are no difficulties with the supply of materials or skilled labour.

### 4. Clients

The Municipality agreed to select three eligible candidates for the project and interviewed a field of eight families. Time constraints made it imperative that the families selected owned their own lots, and had some building skills. The three families selected easily met these criteria, as well as the requirements of the guidelines.

Selected clients include:

| Name | Adult | Child | Former Accommodation |
|---|---|---|---|
| A | 2 | 3 | 102 yr log house |
| B | 2 | 3 | 50 yr old shack |
| C | 2 | 3 | 35 yr log house (shack) |

The income range of participants was from $12500 to $18000 with an average of $14500 pa.

### 5. Site And Servicing Issues

Although the clients owned their own land, it tended to be farm size. To avoid double legal transaction costs for conveyance, it was agreed that the security would be the 25 year forgivable mortgage in the amount of $40000 on each unsevered property. A surveyor's Reference Plan will be required to mark out 1 to 2 acre parcels for each of the units.

A major problem encountered was the need to drill to 400 + feet for a well. Explosive charges placed at this depth failed to explode, making additional drilling very dangerous. No further information is available at this time (march 20/88).

## 6. House Designs

The house design selected by the clients was Plan #65/1048 of 'Select Homes', which the Construction Manager, working as a builder, had constructed some time ago in the neighbourhood and which the clients could look at and examine at their leisure.

The plan is a split-level design; the house is entered at the single storey level (which is over a 4'-0" crawl space). From here a staircase rises to an upper level where there are three bedrooms and a bathroom; under this is a family room and a large utility room, entered from the entrance floor.

The clients were happy with the plan, although one preferred a modified configuration of the roof where the slope over the two components of the house ran in the same direction rather than at right angles. It was believed that this might reduce the accumulation of snow on the roof in this area of heavy snowfall, but there was no evidence that this would be a technical improvement whereas it could be a visual disaster. The modification was therefore not carried out. Prefinished sheet steel is used for the roof finish.

A split-level house in Chetwynd, adpated from a successful builder's design that has been used in the area.

## 7. Tendering And The Materials Package

There was no formal tendering for the materials package or for the sub-contracts. Because of the short time available (the project was only committed in late October) the clients and the Construction Manager went 'shopping' for the best local prices.

## 8. The Construction Process

The following table indicates the approximate breakdown of on-site labour by the various types of participants:

**Table 1 Approx.percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 100 | 0 | 0 |
| Sewage | 0 | 100 | 0 | 0 |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 0 | 100 | 0 | 0 |
| Framing & sheathing | 0 | 0 | 50 | 50 |
| Insulation & AVB | 0 | 0 | 100 | 0 |
| Drywall/panelling | 0 | 0 | 100 | 0 |
| Drywall finish | 0 | 0 | 100 | 0 |
| Roofing | 0 | 0 | 100 | 0 |
| Siding | 0 | 0 | 100 | 0 |
| Door/window inst. | 0 | 0 | 100 | 0 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 0 | 50 | 50 | 0 |
| Heating & Ventilation | 0 | 0 | 100 | 0 |
| Plumbing & Fixtures | 0 | 0 | 50 | 50 |
| Interior electrical | 0 | 100 | 0 | 0 |
| **OVERALL** | **0** | **30** | **60** | **10** |

All clients had some knowledge of construction before the project began, and it was considered that there was no need for formal training sessions. One client was quite skilled and worked as a jobbing carpenter. There was some saving in poouring the footings and the basement floo slab in one pour. Six courses of blockwork (laid by a sub-contractor to ensure an even base for the frame) rise directly from the slab. The families helped each other to get the framing up and closed in, but the rest of the work on each house was done by the individual family with the help of whatever volunteers were available.

## 9. Training And Information

The clients were generally skilled and no formal training was provided.

## 10. Construction Quality

No code violations were observed.

## 11. Project Costs

### Table 2. Committed And Final Project Costs

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 3500 | 3500 | 2.9 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 1500 | 1500 | 1.3 |
| construction manager exp. | 500 | 500 | 0.4 |
| tools | 1000 | 1000 | 0.8 |
| materials package | 79000 | 79000 | 65.8 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 1000 | 1000 | 0.8 |
| labour contracts | 28000 | 28000 | 23.3 |
| miscellaneous | 6200 | 6200 | 5.2 |
| **Total Project Cost** | **120000** | **120000** | **100.0** |
| Other Contributions: | | | |
| Clients | | 20000 | |
| CMHC | | 1000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 141000 | |
| Land & Services (Deduct) | | -20000 | |
| **Est.Net Construction Cost** | | **121000** | |

### Cost Breakdowns

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 120000 | 40000 | 1160 | 34.48 | 371 |
| Net Constr.Costs | 121000 | 40333 | 1160 | 34.77 | 374 |

Note; local prices for equivalent units are $55000 for private-market spec houses, to $68000 for RNH units.

## 12. Views on the Project

This appears to be a model project, requiring a minimum of input from CMHC once it was initiated. Apart from having to drill further than expected to find water, there were no major problems.

## Project Report: Silverwater, Ontario

| | |
|---|---|
| CMHC office: | Sudbury Local Office |
| CMHC Project Officer: | Bob Restoul. |
| Construction Manager: | Ron Middleton. |
| Date visited: | January 12, 1988 |
| Visited by: | Michael Pine |

### 1. Project Overview

The project is located on highway 540 about 40 km west of Gore Bay (Manitoulin Island) and 250 km from Sudbury. Silverwater is an unorganized community and is the only community within the boundaries of Robinson Township. The community has a population of 145 (1982) with approximately 70 households. The homes are scattered along highway 540 and along the concession roads. The centre or hub of the community offers a confectionery store, post office, gas station and garage, church, fire station and the community hall.

The majority of the residents are employed at the mink farm, commercial fisheries or the quarry in Meldrum Bay (25 km). Most jobs are available on a seasonal basis, averaging eight months a year.

The Silverwater project consists of five, three bedroom units located on separate sites within a 5 km radius of the centre of Silverwater. Key dates include the following:

| | |
|---|---|
| Community info. sessions | April/May 1987 |
| Project committed | July 1987 |
| Materials contract awarded | July 1987 |
| Work begins on site | July 1987 |
| First family moves in | Dec/Jan 1988 |
| Last family moves in | Feb 1988 |
| Work ended on site | Feb 1988 |
| Project closed out | Feb/March 1988 |

### 2. Community Selection.

The selection of suitable communities was commenced in November 1986 and a listing of sites was completed by January 1987. Three communities were identified as being top contenders, Shining Tree, Westree and Silverwater. All communities were visited. Shining Tree and Westree produced few eligible applicants, and the only sites were on crown land. Silverwater appeared to have suitable clients and house lots were available. The community is remote with little noticeable housing market activity although building supplies and subtradesmen are readily available.

### 3. Clients

The CMHC project manager delivered flyers to all houses in the community announcing a town meeting to discuss the project. About thirty people attended, seven completed application forms and from these the five clients were selected. All five clients knew each other well through their work, community activities or through being related to everyone else around. None of the clients were particularly young; in one case the two children in the family were all that remained living with their parents of the original ten children. All families were at a stage in life where employment patterns had become settled, with little prospect of improvement. Only one family had realistic plans for the improvement of their housing condition by building their own (log) house over the next ten years.

Selected clients include:

| Name | Adult | Child | Former Accommodation |
|---|---|---|---|
| A | 2 | 2 | Owns old house |
| B | 2 | 2 | Rents shack |
| C | 2 | 2 | Boarding with parents |
| D | 2 | 3 | Rent summer cottage |
| E | 2 | 2 | owns a mobile home |

The income range of participants was from $12000 to $23000 with an average of $17000

### 4. Construction Manager

The Construction Manager is a local man who is the community handyman; the local post office is located in his basement, he does some snowplow work in the winter and grading in the summer. He has worked in construction and locally helped build the fire station. He was selected by the five families themselves at the request of the CMHC project manager. His contract expired before the houses were complete and although he did in fact continue to provide advice, the quality of finishing work suffered in two of the five houses. The CM was well regarded by the clients, who credited him with the success of the project.

### 5. Site And Servicing Issues.

Four of the clients had their own land, and three already had drilled wells available although one proved to be in the wrong place. In one instance the client's land had been severed from his father's farm but the farm well was being used by the client by way of an easement. CMHC began negotiations to acquire a lot for the one client who had no land but decided it would get a better deal if the client did the negotiating. The client got the land for $4000, more than $1000 less than the original estimate. All the lots are now serviced with wells and septic tanks, and although there are traces of sulphur in some wells, it is not causing any problems.

The Silverwater house is a well-laid out three-bedroom bungalow, taken from a Beaver Lumber catalogue. By careful use of the materials provided, augmented by materials supplied by the clients, the same basic house package has been given several variations without additional cost to the project.

The top photo shows the basic package with a manufactured siding and a simple porch design.

## 6. House Designs

After reviewing seven or eight different plans the clients chose a house type from the Beaver Lumber 'A Retreat for all Seasons' catalogue, the 'Tremblant' bungalow. This design provides a gross area of 1092 sq.ft. and is very well suited to rural family life. The design includes three generous bedrooms, a combination bathroom and laundry room and a very large living-dining-kitchen area. All units have crawl spaces, several of which have enough headroom to make a staircase down from the living area desirable, and have the laundry facilities located there.

The construction of the building is conventional 2"x6" exterior wall studs with R20 fibre glass insulation and wood siding. Roof trusses project approx. 4'-0" at one side to cover the balcony deck, insulation is R32 fibre glass. The crawl space foundations are concrete block on poured footings; there is no poured slab. All the houses have electric baseboard heating systems with individual thermostats in each room; one house has installed a wood stove that will probably become the prime source of heat. The windows are vinyl in a cedar frame, the horizontal sliders are double glazed, sealed units. Exterior doors are of wood, and each has a storm door.

Another unit, built by clients who were collecting logs to build themselves a log cabin. Some of the logs have been used to construct the porch supports and railings, while others have been sawn into siding for the gable ends. The siding that was supplied with the package was used as an interior finish in the living room.

Another version of the standard package has a vestibule added by the owner. The porch is unfinished and the roof supports have been deleted; fortunately, these are not sructurally required.

The large covered balcony deck is a great place for storing wood, and one client (the family who were planning to build a log house) has built up the balcony rail with squared logs and this, together with the wood exterior finishes sawn from the family's own lumber has greatly improved the appearance of the exterior. The same family has used the cedar siding displaced by their own sawn lumber as an interior finish on the end wall of the living room, and has provided a wood stove next to the kitchen area. One family added a vestibule at the side door at their own expense, and other families are considering following their example.

**7. Tendering And The Materials Package.**

Since a package house from Beaver Lumber had been chosen there was no formal tendering for the materials package. Materials were delivered to the site as requested by the client or the construction manager. Sub-contracts were let locally.

**8. The Construction Process.**

Apart from the case of one family who had already excavated for a foundation of a (log) house, excavations were done by the construction manager acting as a sub-contractor. The blockwork was done by a professional to ensure that the following work could proceed from a secure base. The sub-contractors were all local and varied from adequate to good. Since the clients were well known to each other and to the community, a call to the community to assist in a 'building bee' in exchange for light refreshments and lunch resulted in up to forty volunteers appearing at the sites. This project is notable for the quantity and quality of it's volunteers. The following table breaks down the labour that went into the project;

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 90 | 10 | 0 |
| Water supply | 0 | 100 | 0 | 0 |
| Sewage | 0 | 50 | 50 | 0 |
| Electrical hookup | 0 | Hydro | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 0 | 40 | 50 | 10 |
| Framing & sheathing | 0 | 0 | 60 | 40 |
| Insulation & AVB | 0 | 0 | 50 | 50 |
| Drywall/panelling | 0 | 0 | 50 | 50 |
| Drywall finish | 0 | 0 | 80 | 20 |
| Roofing | 0 | 0 | 50 | 50 |
| Siding | 0 | 0 | 50 | 50 |
| Door/window inst. | 0 | 0 | 60 | 40 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 0 | 0 | 100 | 0 |
| Heating & Ventilation | 0 | 0 | 0 | 0 |
| Plumbing & Fixtures | 0 | 0 | 70 | 30 |
| Interior electrical | 0 | 75 | 25 | 0 |
| **OVERALL** | **0** | **20** | **50** | **30** |

**9. Training And Skills.**

All the clients started with some knowledge of construction and so there was no need for formal training, however all said that they benefitted from advice and training given by the construction manager on the job, and that the actual business of building a complete house gave them a better understanding of construction. All felt that they could now build a house or an extension without additional instruction.

**10. Construction Quality**

The construction quality of the structure appeared to be excellent; however there may be some frost penetration at the footings near the external access doors to the crawl spaces, and this should be watched. Since the houses had only recently been occupied omissions may have been subsequently made good. The insulation at the headers in the basement was not wrapped with a vapour barrier; there was no moisture barrier on the floor of the crawl space; the extract fans in the kitchens and bathrooms had not all been installed. The window frames were designed for a 2"x4" wall and trim had to be installed on site to fit them to a 2"x6" wall; this may have caused some unintentional breaks in the integrity of the vapour barrier.

The plaster finish in at least two houses was poor - something that the use of gloss or semi-gloss paint did nothing to disguise. People new to the job tend to try to fill the joints alone without feathering the joint filler away from the joint to give a smooth finish

**11. Views On The Project**

There has been little or no adverse community reaction. Both the public and the local MP's and MPP's have been kept fully informed of the intent and nature of the program. In spite of being derived from a Beaver Lumber catalogue, the clients unanimously selected the house design from a field of six or seven others, and it is without doubt one of the best bungalow layouts for a remote clientele that has been encountered during our examination of the RNH Demonstration program. (The actual layout is described under (6), House Designs)

The selection of this community, the choice of clients and construction manager were all in strict conformity with the guidelines. This is the first time that the Sudbury office of CMHC has undertaken a Demonstration project, and they are to be congratulated on an excellent job.

As a totally separate issue, it is necessary for CMHC National office to give some further guidance on the use of crawl spaces (Operational Guidelines, item #7) In this and many other projects the crawl spaces are 5 to 6 feet high, and another course or two of blocks would give the clients a working basement at minimum additional cost. By the time the house is finished, if not before, the client is quite aware of this fact and is invariably a bit upset, and in typical cases intend to further dig out a part of the crawl space to form a basement - a difficult, possibly dangerous and a largely unnecessary undertaking. As an effort to keep these houses as inexpensive as possible, the MHC preference for crawl spaces rather than basement space may be self-defeating.

## 12. Project Costs.

**Table 2.** **Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 8300 | 0 | |
| land | 5000 | 4010 | 2.0 |
| fees & permits | 0 | 2930 | 1.4 |
| construction manager | 10000 | 4000 | 2.0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 110200 | 158157 | 77.6 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 5600 | 0 | 0 |
| labour contracts | 58300 | 34390 | 16.9 |
| miscellaneous | 2500 | 417 | 0.2 |
| **Total Project Cost** | **199900** | **203904** | **100.0** |
| Other Contributions: | | | |
| Clients | | 37800 | |
| CMHC | | 10000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 251704 | |
| Land (deduct) | | -4010 | |
| Services (deduct) | | -16755 | |
| **Est.Net Construction Cost** | | **230939** | |

### Cost Breakdowns

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| **Project Budget** | 199900 | 39980 | 1365 | 29.29 | 315 |
| **Net Constr.Costs** | 230939 | 46188 | 1365 | 33.84 | 364 |

## Project Report: Parklands, Manitoba

| | |
|---|---|
| Local Office: | Winnipeg |
| CMHC Program Officers: | Bill Leigh (Matheson Island Project)<br>Gordon Roulette (Parklands/Baden) |
| Construction Managers: | Sam Richards<br>Larry Unger |
| Date visited: | Feb. 16-18, 1988 |
| Visited by: | Hai-Toh Lim |

### 1. Project Overview

The Parklands Project consists of seven units in three physical locations:

| | |
|---|---|
| The Bluff: | 2 3-BR units |
| Red Deer Lake: | 4 units (two 1-BR, one 3-BR, one 4-BR) |
| Baden | 1 4-BR unit |

All three communities are very small and have no titled land. Most of the people are of native descent. There are no existing Section 40 units in the communities. Red Deer Lake and Baden both have three houses built under the 1986 Demo program.

The Bluff is 56 kilometres north of Mafeking on the shore of Lake Winnipegosis and is accessible by a gravel road. The Bluff was originally a fishing camp occupied by families from Shoal River Band or Pelican Rapids. The town has a harbour and a dock. Approximatelu five years ago, hydro was brought into The Bluff when the gravel road was built. There are four substandard houses housing five families. The nearest town with services is Mafeking and the nearest public phone is one and a half miles away. The main income sources are fishing and social assistance, with some hunting.

The families living in The Bluff belong to one extended family. The lead family has lived in this location for the last fifteen years, has raised children here and has no desire to return to the Reserve in Pelican Rapids.

Red Deer Lake is accessible by gravel road off Highway #227 on Red Deer Lake. The community is the most organized among the three, with a housing committee consisting of elected community members. The quality of housing is better than in the other two communities. Red Deer Lake used to have a thriving sawmill in the 20's which employed 200 men and had a railway track connecting the mill to Barrows. The mill was closed when logs ran out and its components were hauled out and sold during the second world war. All that remains of the logging era are the ruins of the mill and the gravel road leading to the community, which was built on the old railroad bed. Red Deer Lake has a community hall, two ball diamonds, an ice rink, a park with a concession stand, a dock and a manned fire watch-tower. The main income sources are fishing and social assistance. There is little employment opportunity, although some seasonal work is available on nearby farms.

Refer to Baden Project for information on Baden.

Dates of Key Project Events are as follows:

| | | |
|---|---|---|
| Potential client interview | | early June, 1987 |
| Materials tender awarded | | late July, 1987 |
| Work begun on site - | The Bluff | late July, 1987 |
| | Red Deer Lake | late July, 1987 |
| | Baden | late August, 1987 |
| First family moved in - | The Bluff | early Nov., 1987 |
| | Red Deer Lake | late Oct., 1987 |
| | Baden | early Feb., 1988 |
| Last family moved in - | The Bluff | mid Nov., 1987 |
| | Red Deer Lake | early Dec., 1987 |

**2. Community Selection**

A list of communities in need of housing was provided by the Manitoba Metis Federation (MMF). CMHC visited the potential communities to gauge their housing needs and eligibility. Two of the communities were rejected as there are existing Section 40 houses and some vacant public housing, suggesting that the demand for housing is not as critical as in other communities. The operational guideline of putting Demo houses in off-reserve and remote communities with no Section 40 units greatly restricted the choice of community. Four communities were selected, two of which were the same as for Demo 1986.

**3. Client Selection and Characteristics**

The CMHC L.O. was in charge of client selection in all three communities. Everyone in need of housing was visited by the CMHC Program Officer, candidates being drawn from a list of priority clients provided by the lead family in The Bluff and by the Red Deer Lake Housing Committee. Due to Demo 1986 experience, the local housing committee of Baden was bypassed in the client selection process. CMHC resisted pressure from the local MMF representatives who wanted Demo houses to go to only Metis clients.

Criteria used for client selection were: housing conditions, overcrowding, family size/composition, housing senior citizens, permanent residency, history of arrears and availability of labour for construction.

Most of the clients selected have young children, and have little hope of building their own houses in the near future. In Red Deer Lake, two senior citizens were originally assigned a semi-detached unit. This was changed to two single 1-BR units before construction began after CMHC learned that the seniors do not get along and cannot live next to each other in peace. An additional $4,970 was paid to the plumbing contractor in order to service the units separately. The Red Deer Lake Housing Committee was satisfied with CMHC's selection.

Selected clients include:

| Client | Adult | Child | Former Accommodation |
|---|---|---|---|
| **The Bluff:** | | | |
| A | 2 | 2 | Owned a 12'X16'shack |
| B | 1 | 2 | Living with father |
| **Red Deer Lake:** | | | |
| C | 2 | 1 | Owned substandard trailer |
| D | 3 | 3 | Owned substandard trailer |
| E | 1 | | Owned deteriorated cabin |
| F | 1 | | Owned leaky shack |
| **Baden:** | | | |
| G | 2 | 3 | Extended family shared substandard house |

The income range of participant families was from $5,300 to $11,900 with an average of $7,900.

**4. Project Organization**

The CMHC Program Officer provided overall project management, coordination and on-site supervision to all three locations. All invoices were checked against material lists and were authorized by the Program Officer. Separate cost controls for each unit were set up. The Program Officer was assisted by two Construction Managers who provided training and supervision to the homeowners and volunteers. One of the Construction Managers, who is from the local area, was basically in charge of the Red Deer Lake units from mid-August to mid-October, 1987. The Program Officer took over after the first contract expired.

The second Construction Manager, who understands Cree, was first contracted to take charge of the two log units in The Bluff from late July to late September, 1987. His contract was extended to mid-December for the Baden units. He was the Construction Manager for all three locations while the Program Officer was away on leave and after the Program Officer returned to Winnipeg L.O. In January 1988, Delaurier Construction Ltd., a contractor from Swan River, was contracted for sixteen days to finish up the Parklands and Baden Projects. Delaurier Construction Ltd. used its own crew for the Work.

CMHC had difficulty filling the positions of Construction Manager, having to take whoever was able and available. The first Construction Manager is a journeyman carpenter with experience in steel and wood frame construction. The second has sixteen years of carpentry experience and is familiar with log construction, though this was the first time he had worked with floor truss joists. He learned about the job through Manpower. Both Construction Managers lack leadership qualities and teaching ability.

Both Construction Managers reported directly to the Program Officer. A construction log was kept every day by the Construction Managers to record workers' input, project progress and other site-related problems. Coordination of subtrades, material ordering and deliveries were the responsibility of the Program Officer.

Construction insurance was purchased by L.O. for all 1987 Demo Projects. Tools purchased under the 1986 Demo Projects were reused in this year's projects.

**5. Site and Servicing Issues**

The land is leased from the Province of Manitoba. The Bluff is unsurveyed, Red Deer Lake was surveyed and subdivided by Northern Affairs last winter and Baden has been surveyed and a subdivision plan will be prepared in the near future.

All three locations are serviced by hydro. Firewood for heating is plentiful in the surrounding areas. Outhouses are the community norm. In The Bluff, water is obtained from the lake in winter and from a nearby well in summer. In Red Deer Lake, water from from Barrows is trucked to the holding tank in a community pump house. The residents do not like the quality of the water from the pump house as it is too chlorinated, and they use it mostly for washing. Drinking water is sometimes obtained from the lake.

Each of the two 1-bedroom units for the seniors has its own well and septic sewerage disposal system. They are the only houses in Red Deer Lake with running water and flush toilets. One of the wells produces good water, whereas the water quality of the other well is not good (too salty). Some kind of filtering system might be required.

In Baden, water is drawn from the creek. A community well will be provided by Northern Affairs in the near future for The Bluff and Baden. All homeowners expressed the desire to have running water and indoor plumbing once these services are available in the communities.

Most clients chose the location and orientation of their houses. Good views, sunlight and easy access were some common factors. One of the clients in The Bluff would prefer the windows of the house to face the lake. One client in Red Deer Lake liked the site as the school bus stops right in front of the house.

Red Deer Lake is governed by flood plain control. A surveyor from Northern Affairs was at the building sites to set the correct elevations and to ensure that the units are above the flood level. The owner of the 4-bedroom unit felt that the house is too high off the ground. Red Deer Lake is a windy site.

**6. House Design**

The 3- and 4-bedroom units re-used plans from the 1986 Demo projects in Long Body Creek/Red Deer Lake/Baden, with the exception that a 16" overhang was incorporated in the 1987 Demo houses. The design of the two 1-bedroom units (originally a duplex) in Red Deer Lake came from the Manitoba Housing and Renewal Corpora-

A three-bedroom log unit in The Bluff

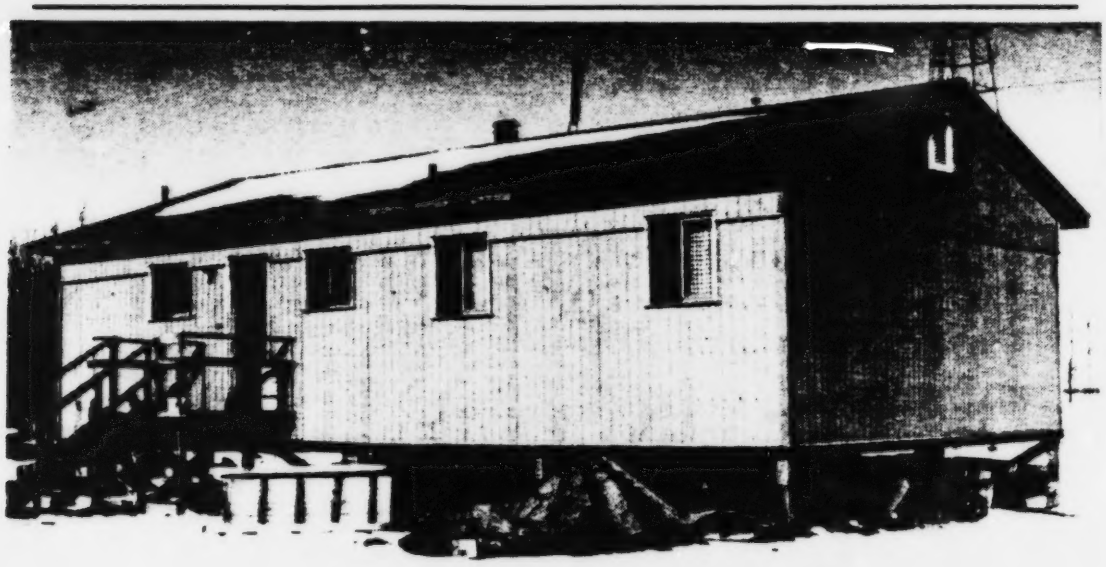
tion and was selected by the Program Manager. At the suggestion of the Prairie Regional Office, logs were used for the building envelope of the two 3-bedroom units in The Bluff. The 1-bedroom unit has a floor area of 576 sq.ft; the 3-bedroom unit, 864 sq.ft.; the 4-bedroom unit, 1,008 sq.ft.

The owner of the 3-bedroom unit in Red Deer Lake would prefer a bigger master bedroom, and the owner of the 4-bedroom unit would like to have more storage space as the family will have to use their old trailer as an additional storage shed. One of the seniors would like to install eavestroughing and put a small window on the north wall in the living room. He would also like to increase the height of the crawl space so that he can put a wood stove in the basement.

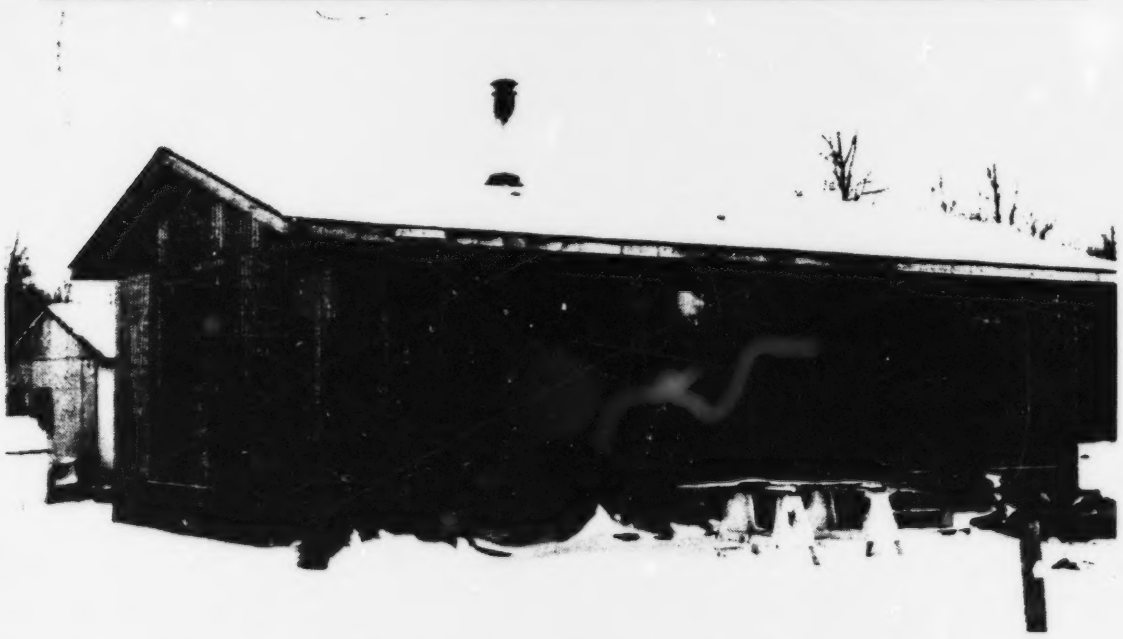
The roof is constructed is of 24" O.C. prefab high-heel trusses with R-40 blown-in fiberglass insulation. The 1-bedroom units have a 2' overhang. Attic ventilation is provided by soffit and gable vents. 6 mil. AVB was placed under the roof trusses, followed by sheathing and ceiling tiles. Attic access is from the gable end.

The floor is constructed of is truss joists at 24" O.C. For units with open crawl spaces (3- and 4-bedroom units in Red Deer Lake), the floor is insulated with R-40 batt fiberglass insulation and the exposed bottom of the floor is sheathed. 3/4" select subfloor is covered with sheets of resilient flooring.

At The Bluff, 8" square logs (white poplar) are used for exterior walls and 2"x4" studs for interior partitions. 3/8" foam gaskets were placed between the log courses and



Four-bedroom unit with open crawl space in Red Deer Lake



One-bedroom senior citizen in Red Deer Lake

end-to-end butt joints. Caulking was then applied, both inside and outside, along all joints. Proper techniques were observed for installing windows and door openings, interior partitions and trim, to take into account log movement and shrinkage. The log walls (every three courses) are tied together by wood dowels spaced every 32 inches. The dowels are countersunk to allow for log shrinkage. The homeowners had a choice of colour for wood varnish/stain.

At Red Deer Lake and Baden, 2"x6" studs @16" O.C. are used for exterior wall with R-20 fibreglass batt insulation. AVB is on the warm side of the wall. The exterior is wrapped in "Tyvek" air barrier. 3/4" finished exterior sheathing is used as cladding.

1/4" panelling is used throughout on the interior walls. The homeowners were given a choice of colours.

Foundations for The Bluff (3-bedroom unit) consists of PWF with 2' heated and vented crawl space. A trench was dug along the perimeter of the house to a depth of 5' to 6'. PWF were placed on top of a bed of compacted gravel. Due to the weight of the logs, the studs are spaced at 12" O.C.. The studs are sheathed on both sides and 2" rigid insulation was attached to the outside of the PWF and floor trusses, and also between the studs for a total of R-20 insulation. 6 mil poly was used as a moisture barrier on the outside of the PWF below grade. The rigid insulation was protected by P.T. plywood above grade. 6 mil poly served as ground cover and its edges were protected by a wood nailer fastened to the wall. The crawl space has four closeable vents, located on the opposite side of the foundation wall.

At Red Deer Lake (3- and 4-bedroom units), a P.T. post and pad footing system was used. A trench similar to that described above was dug and a compacted gravel bed was put in place before the footing assembly was installed. The pads were insulated with 2" rigid insulation and the posts were wrapped in poly to minimize frost action. The corners of the foundation were braced with diagonal members for stability.

The 1-bedroom unit in Red Deer Lake was built with PWF with a 2' heated and vented crawl space. This is the same as The Bluff's with the exception of stud spacing (16" O.C.).

The Baden 4-BR unit is similar to the Red Deer Lake 1-bedroom unit.

Wood windows are double-glazed with sliders. The 1-bedroom and 3-bedroom units have one entrance door of insulated steel type. A 1-bedroom unit has a half-lite entry door. The 4-bedroom units have two entrances with insulated steel doors.

Only roughed-in plumbing is provided in these units, except for the two 1-bedroom units for seniors in Red Deer Lake. A vanity with basin is the only plumbing fixture provided in the bathroom. A double sink is provided, but most homeowners will install it only when running water is available for the community. The 1-bedroom seniors' houses have their own septic tanks and fields, wells, pumps and electric hot water tanks. Three-piece bathroom fixtures and kitchen sinks are provided.

All units have 200 amp. electrical services. Smoke alarms were installed in the hallway. Electric baseboard heating was installed in all units, except in the two 1-BR units in Red Deer Lake which have electric hot-air furnaces with air supply ducts to every room. Return air grilles are centrally located on the wall in the hallway. Wood stoves are provided for all units, and used as the main heat source by most residents to save hydro costs. Electric heat is being used as main heat source in a unit in Baden as the homeowner was too busy to cut wood. All homeowners found that their houses were easy to heat and stayed very warm. It cost the owners of the 3-bedroom unit in Red Deer Lake $84 a month to heat the house with electric heat only, $30 if wood stove was fired up. It cost the owners of the 4-bedroom unit in Red Deer Lake $26 a month, using wood heat only.

A dehumidistat-controlled ventilation system will be installed in all units. For the 3- and 4-bedroom units, fresh air intake will be close to the wood stove and two exhaust grilles. One in the bathroom and the other in kitchen/dining area will be mounted on the walls and ducted outdoors (through the crawl space, if any). The central exhaust system, powered by a 400-cfm downdraft blower, is controlled by dehumidistat switches, wired directly to the electrical panel. A ceiling fan is installed near the wood stove in the living area to circulate air to individual rooms through door undercuts. In the 1-bedroom unit, fresh air will be ducted to the furnace air return. There is an access panel on the crawl space wall near the plenum.

The most common major appliances are: fridge, range (without ventilation hood) and freezer. Some of the homeowners have more than one freezer and some plan to install a washer in the future. There is no designated space for freezer and washer (except in the 1-bedroom unit); as a result, these appliances will be put in the bedroom.

### 7. Tendering and Materials Package

CMHC L.O. was in charge of the tendering of the materials package and subtrades. The tender was based on a specifications and materials schedule prepared by the Program Officer. Policy requires that invited bids be under $25,000, so each house was tendered separately in order not to exceed that maximum.

Eight bidders were invited to supply the materials package, and seven responded. Three different suppliers were awarded the materials package contracts for each house type – 1-bedroom, 3-bedroom and 4-bedroom. Four suppliers were invited to bid for the supply of logs. Three electrical and two plumbing contractors were invited to bid for the electrical and plumbing contracts, and two local firms won the contracts. In all cases, the lowest bidder was chosen. All materials package suppliers were from the local area with the exception of the supplier for the two 1-bedroom units in Red Deer Lake. This supplier delivered all building materials in one load to save delivery costs. The logs were delivered in two packages. The local materials suppliers delivered materials on demand as arranged by the Program Officer.

The L.O. plans to include in future materials package supply contracts a clause to deliver the package house-by-house in three logical construction stages: 1) founda-

tion and floor; 2) framing, insulation and AVB; 3) exterior cladding and interior finishes. This will greatly speed up and ease the construction progress. The delivery schedule will also solve the problem of site storage, breakage or loss.

## 8. The Construction Process

The following table provides an approximate breakdown of the relative on-site labour of the various types of participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type Of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 0 | 0 | 0 |
| Sewage | 0 | 0 | 0 | 0 |
| Electrical hookup | 0 | Hydro | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 20 | 0 | 20 | 60 |
| Framing & sheathing | 20 | 0 | 20 | 60 |
| Insulation & AVB | 0 | 25 | 25 | 50 |
| Drywall/panelling | 0 | 0 | 0 | 0 |
| Drywall finish | 0 | 0 | 0 | 0 |
| Roofing | 15 | 0 | 20 | 65 |
| Siding | 15 | 0 | 20 | 65 |
| Door/window Inst. | 40 | 0 | 15 | 45 |
| Int. Fin, exl.drywall | 0 | 20 | 25 | 55 |
| Cabinetwork | 0 | 10 | 20 | 70 |
| Heating & Ventilation | 0 | 100 | 0 | 0 |
| Plumbing & Fixtures | 0 | 100 | 0 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| Other - steps, landsc. | 0 | 0 | 30 | 70 |
| **Overall** | **15** | **35** | **10** | **40** |

The clients and volunteers worked in teams, under the supervision of the Construction Manager and the Program Officer. In The Bluff, the work team consisted entirely of volunteers as one homeowner has a heart problem and the other is a single mother. In Red Deer Lake, clients with their friends and relatives were mainly responsible for their own houses. The two seniors' units depended on volunteer labour from the community. However, the 4-bedroom unit and one 1-bedroom unit in Red Deer Lake had problems getting volunteers from the community. The owner of this 4-bedroom unit had to hire four men from outside the community at a cost of $800 to install the siding and the Construction Manager ended up building most of this 1-bedroom unit.

Construction of the one 4-bedroom unit in Baden was held back to wait for the tendering process for the Baden Project to be completed. Since the level of client and volunteer participation was not very encouraging, the Construction Managers had to put in more than their share of menial labour.

In The Bluff, the square logs were strapped together 4 wide and 6 high in lengths varying from 6' to 12'. The delivery truck had a lifter to unload the logs. There was

nobody on site when the logs were delivered and, as a result, they were left on the ground with no proper protection. The logs were somewhat green, especially for one of the two units. Some of the logs were of poor quality and had to be rejected. 1500 LF of logs had to be replaced, about 30% wastage. Logs were in short supply at times while builders waited for replacement deliveries. This did not create much delay as the work crew was reassigned other tasks in the meantime. It took approximately a week to put the log walls up for one unit.

In Red Deer Lake, the Program Officer and Construction Manager were not satisfied with the one-load delivery of the materials package for the 1-bedroom units. This created on-site storage problems; materials were not properly protected from the elements and were scattered over the community. Windows, doors and finishing materials were stored in the community garage/shed, and some tools were kept in the Construction Manager's van. Big items were left unprotected on site. Some building materials and tools were missing or stolen and this was reported to the police.

The homeowners of the 3- and 4-bedroom units in Red Deer Lake complained about the delay in materials delivery. It was alleged that excavation was completed six weeks before the arrival of building materials. Due to shortages, the owner of the 4-bedroom unit had to purchase extra trim ($84) to complete the finishing work.

Self-help had an adverse effect on the construction schedule due to poor worker motivation, especially for one 1-bedroom unit in Red Deer Lake. The level of client and volunteer participation was below that of the 1986 Demo project in the same community. It is very interesting to note that clients from the 1986 Demo project did not volunteer to help the 1987 Demo clients despite what they said in last year's interview. The Construction Manager estimated that he would have finished the work 45% faster if he had had his own crew. The Construction Manager for The Bluff has no problem with the labour input and felt that self-build did not affect the schedule in this case.

### 9. Training And Skills

Most of the construction training was provided on-site to groups by the Construction Manager. In The Bluff, one of the volunteers had taken carpentry training before, but log construction was new to him. The rest of the volunteers had few skills to start with but have learned enough through the Demo Project that they now feel they could build their own houses if materials were available.

In Red Deer Lake, the lead worker of the 3-bedroom unit had prior construction experience and the novice lead worker of the 4-bedrdoom unit has improved his skill somewhat. Since there was no steady work crew for the two 1-bedroom units, it was impossible for the Construction Manager to assess the skill improvement. All clients credited the Construction Manager and their own work experience for their improvement in skills. They learned relatively little from each other since there was little cooperation between client households. Most clients learned enough to be able to maintain their houses.

## 10. Construction Quality

There were four compliance inspections scheduled for the Parklands and Baden Projects. However, CMHC inspectors made quite frequent unscheduled visits to the houses whenever they were in the neighbourhood. An inspector report was filed for every scheduled inspection and appropriate action was then taken. One of the scheduled visits was to investigate the problem of excessive floor truss deflection in some of the 1986 and 1987 Demo units. The floor truss spanned 24 feet clear across the foundation supports. The deflection problem seemed to be worst during the heating season in Demo houses with open crawl spaces. The inspectors felt that this might be due to the extreme temperature differences between the top and bottom cords of the trusses. The deflection problem was not obvious in the 3-bedroom units, which could be due to the open layout of the kitchen/dining/living room, with no long partition to amplify the problem. The floor deflection is being monitored for each unit. Further investigations are needed before a solution can be found.

CMHC field inspectors were not very satisfied with the limited role they played in the Demo Program. Acting in an advisory role, they felt frustrated, powerless and unsure of the usefulness of their inspection trips and reports.

All plumbing and electrical work was done by subtrades. Manitoba Hydro provided electrical hook-up services to the houses. All units except the 1-bedroom seniors' housing lack indoor plumbing at the moment.

The quality of AVB sealing/airtightness, interior finishing and trim Work was below average standard in most units. The most common examples of poor interior finishing were: 1) missing trims; 2) no or poor fit of mitre joints; 3) window and door trims were butted against the frames either because they were not made for the correct wall thickness, or not installed or trimmed to the same plane as that of the wall panelling.

Linoleum was installed by subtrades as the experience of 1986 Demo projects demonstrated that unskilled homeowners did a poor job in laying linoleum.

Backfill of PWF has settled and will have to be redone in spring. The 6 mil poly moisture barrier outside of the PWF was stapled to the P.T. plywood cover at grade level. It should be placed behind the plywood for protection during backfilling. Deck, railings, steps, caulking, painting/staining and functional grading will have to be done in spring. Some homeowners would like to put gravel around the house; others want to sod the surrounding area to stabilize the disturbed soil. Some of the units were built too close to their old dwellings, creating potential fire hazards. Some of the old shacks were meant to be taken down or moved to other locations for use as storage sheds or workshops, but there is no guarantee that this will happen.

There is no AVB and drainage sump in the PWF at any of the three locations. The Program Officer felt that there is so far no problem with drainage in this area as the soil is sandy. However, the CMHC Inspector was concerned about drainage for the

PWF. The joints of the 6 mil poly ground cover was caulked everywhere but at the edges. The ground cover is not protected by a layer of sand.

All crawl space vents are either not cut yet or closed. The lack of AVB on the warm side of the PWF is not critical since no fiberglass insulation is used for the wall. For units with open crawl spaces, there is no AVB on the warm side of the floor.

The dehumidistat-controlled ventilation system had not been installed yet during the visit by the monitoring consultant. There were signs of high humidity/condensation problems in all units. It was especially serious in one of the log houses as the logs were very green. Mould stains were apparent on window sills and logs, particularly behind furniture where air circulation was obstructed. The moisture problem should be eliminated when the mechanical ventilation system is in place. Education is vital to make sure the homeowners do not turn off the device.

There is no AVB and insulation in the walls of the two log houses in The Bluff. Most interior trim had been installed. Some trim was nailed directly to the log walls, and, due to log shrinkage, had already buckled between nailing spots. The exteriors were not yet weathertight. Interior and exterior caulking between the logs and other caulking works, e.g. windows and doors had not yet been completed. There was no flashing over windows and doors. A wide roof overhang might give better weather protection to the openings in light of the difficulty of installing flashing over windows and doors in log walls.

The entrance door of one unit in The Bluff, which was installed without the supervision of Construction Manager, needed adjustments and flashing at the sill. The door was damaged but there were some signs that it might have been caused by forced entry.

The construction quality was generally higher in Red Deer Lake. In the 1-bedroom units, well pumps were plugged into outlets on the sewerage pumps. The Inspector wanted the electrician to rewire the well pump directly to the electrical panel. The exteriors were not completely weathertight yet. There was no flashing over windows and doors. The portion of the wall under the door sills had not yet been clad. Exterior corners and soffit trims were missing. Butt joints of the P.T. plywood cover were not caulked. Some caulking around the openings was applied over gaps larger than 3/4". Large gaps should be packed with oakum or covered with trim before caulking is applied. Gable vents were to be installed.

Caulking was not very well applied in the 4-bedroom unit in Red Deer Lake. There was a gap at the bottom of the partition between the living room and dining room/kitchen. This could be due to excessive floor joist deflection or uneven settlement of the foundation. The 3-bedroom unit had one more gable vent to be installed. A partition in the bathroom had pulled away from the exterior wall, which could be a sign of uneven settlement. As in the 1-bedroom unit, caulking had been applied over too-wide gaps between some siding and the window/door frames.

Refer to the Baden Project for the assessment of construction quality of the 4-BR unit in Baden.

## 11. Project Costs

**Table 2.Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 400 | 80 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 400 | 0 | 0 |
| construction manager | 14000 | 10500 | 4.7 |
| construction manager exp. | 2000 | 1745 | 0.8 |
| tools | 2000 | 1136 | 0.5 |
| materials package | 214000 | 153359 | 68.1 |
| extra freight costs | 3500 | 1206 | 0.5 |
| equipment rentals | 1000 | 1800 | 0.8 |
| labour contracts | 39200 | 50421 | 22.4 |
| miscellaneous | 4700 | 4858 | 2.2 |
| **Total Project Cost** | **281200** | **225100** | **100.0** |
| Other Contributions: | | | |
| Clients | | 900 | |
| CMHC | | 9500 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 235500 | |
| Land & Services (Deduct) | | 0 | |
| **Est.Net Construction Cost** | | **235500** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 225100 | 32157 | 823 | 39.07 | 421 |
| Net Constr.Cost | 235500 | 33643 | 823 | 40.88 | 440 |

It was estimated that a similar 4-bedroom unit, with the same level of service, could be built by a private contractor for $50-55,000. A similar 1-bedroom unit would cost $45-48,000 plus approximately $4,500 for drilled well and septic system. A conventional stick-built or a ready-to-move house in this area would cost $67,000 all inclusive, with electric furnace, hot and cold running water, sewerage and electrical services. An additional $2,000 would be required if the building envelope were of log construction.

## 12. Views on the Project (See also to Baden Project)

## 13. 1986 Demo Houses

All three 1986 Demo houses in Red Deer Lake were visited by the monitoring consultant. All units seemed to be kept in a reasonably good manner. One of the homeowners built an outhouse in the same style as that of the Demo house, with matching paint patterns. One of the homeowners had a paraplegic grandson and was going to build a new ramp to replace the existing one which was too steep and without rail-

ing. There were signs that the linoleum flooring would not last very long. In two of the three units, the flooring had lifted at the seams in quite a few places, making it hard to clean and unsafe. This could be due to poor quality, poor installation or problems caused by excessive floor deflection. All houses had been painted or were in the process of being painted though the quality of the paint job was poor. All nails on the bottom floor sheathing had popped.

The owner of the 3-bedroom unit that is closest to the lake complained about the house being too high off the ground. The house felt unstable during high wind. The house is very cold and drafty and the floor is always cold. The owner had to spend $80 a month on electric heat to supplement heat from the wood stove just to keep the place warm enough. The entrance door did not close properly. The CMHC Program Officer had advised this homeowner not to put the house so close to the lake during site selection in 1986.

The house with ramp remained at the same stage of completeness as when the project was closed out in March, 1987. There was still no caulking around windows and doors, the exterior corner trim or fascia, and some interior trims were still missing.

## Project Report: Baden, Manitoba

| | |
|---|---|
| Local Office: | Winnipeg Office |
| CMHC Project Officer: | Gordon Roulette |
| Construction Manager: | Sam Richard |
| Date visited: | Feb. 16/17, 1988 |
| Visited by: | Hai-Toh Lim |

### 1. Project Overview

Baden is situated on Provincial Highway #227, 86 kilometres north of Swan River. A freight rail line runs through the community, but the community is only accessible by road as there is no rail station. The people are of native descent and the major source of income is social assistance, supplemented by some hunting and log cutting. Employment opportunities are limited.

Baden started out as a squatter community with temporary skid houses. Its housing situation has improved since the 80's, with three houses built by the MMF in 1982, followed by three more houses built under the 1986 Demo Program. Four more units were added to the housing stock under the 1987 Demo Program.

Baden was allocated one 4-bedroom unit under the Parklands Project in late June, 1987. Three additional 4-bedroom units were assigned to Baden on August 6, 1987. Separate files and books were set up for these three units, known as the Baden Project, which is described in this report.

Dates of key Project Events are as follows:

| | | |
|---|---|---|
| Potential client interview/application | | mid-June, 1987 |
| Materials tender awarded: | Parklands Project | late July, 1987 |
| | Baden Project | mid-Aug., 1987 |
| Work begun on site | | late Aug., 1987 |
| First foundation completed | | early Oct., 1987 |
| First house closed in | | mid-Nov., 1987 |
| First family moved in | | early Jan., 1988 |
| Last family moved in | | early Feb., 1988 |

### 2. Community Selection (see also Parklands Project)

Three units were set aside for northern Manitoba in the 1987 Demo Program. Since the MMF did not come up with any suggestions and, considering the time of year, to avoid further delay, these three units were added to the Baden location where the client selection process was already in place and there were applicants in need and waiting. Being one of the targeted communities in the 1986 Demo Program, CMHC is familiar with Baden and vice versa. Another advantage of Baden was the availability of a good supply of volunteers with newly learnt skills resulting from participation in the 1986 Demo Project.

**3. Clients (see also Parklands Project)**

One applicant who was originally selected was replaced by another applicant when it was found that he had outstanding arrears with the Corporation. A list of selected clients follows:

| Client | Adult | Child | Former Accommodation |
|---|---|---|---|
| A | 2 | 4 | Owned 16'X20' shack which was vacated by 1986 Demo client |
| B | 3 | 5 | Owned substandard 24'X20' house with no foundation |
| C | 4 | 1 | |

**4. Project Organization and Construction Manager**

(See Parklands Project)

**5. Site And Servicing Issues (see also Parklands Project)**

The Program Officer was forced to close two excavations at a cost of $350. One of the lots had a high water table, and the other lot had already been leased by a person other than the client.

**6. House Design (see also Parklands Project)**

All four units have heated crawl spaces. Three out of the four homeowners were very satisfied with the layout of their 1,008-sq.-ft. 4-bedroom units. The other homeowner had put up an 8'-long half-height partition in the living room to create a more defined hallway leading to the bedroom areas. The second closet in the bedroom next to the living room was eliminated to increase the size of the living room. The owner would like to block off the existing doorway to the kitchen so that additional kitchen cabinets can be installed. The new doorway would open into the hallway. Above the vanity in the bathroom, a top cabinet was added.

**7. Tendering and Materials Package (see also Parklands Project)**

Eight bidders were invited to supply the materials package, and six responded. Ironically, the successful bidder for the 4-bedroom units in the Parklands Project failed to come up with the lowest price for the houses in this project. Therefore, the materials package was awarded to another supplier from the same area. Four electrical and three plumbing contractors were invited to bid on the electrical and plumbing contracts. The electrical contract was awarded to a firm from Winnipeg, whereas the plumbing contractor from the Parklands Project was selected again.

**8. The Construction Process**

The client work team moved from house to house in the beginning of the project (foundation stage). One of the clients stopped coming, as he had a job. The rest of the clients decided to stop working on each others' houses from then on. The dissident client eventually quit his job so he could work on his house. He also hired someone at

A typical Baden unit

a cost of $100 to help with the interior finishing. A local contractor was hired in January, 1988 for 16 days to finish up the Parklands and Baden Projects. There were few volunteers from the community. The following table provides an approximate breakdown of the on-site labour that went into the Project:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 10 | 0 | 0 |
| Water supply | 0 | 0 | 0 | 0 |
| Sewage | 0 | 0 | 0 | 0 |
| Electrical hookup | 0 | Hydro | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 20 | 0 | 70 | 10 |
| Framing & sheathing | 20 | 0 | 70 | 10 |
| Insulation & AVB | 0 | 30 | 70 | 0 |
| Drywall/panelling | 0 | 0 | 0 | 0 |
| Drywall finish | 0 | 0 | 0 | 0 |
| Roofing | 20 | 0 | 70 | 10 |
| Siding | 20 | 0 | 70 | 10 |
| Door/window inst. | 30 | 0 | 70 | 0 |
| Int. Fin, exl.drywall | 0 | 20 | 80 | 0 |
| Cabinetwork | 0 | 75 | 25 | 0 |
| Heating & Ventilation | 0 | 100 | 0 | 0 |
| Plumbing & Fixtures | 0 | 100 | 0 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| Other - steps | 0 | 0 | 100 | 0 |
| OVERALL | 15 | 35 | 45 | 5 |

The construction of the one unit in the Parklands Project was put on hold during preconstruction preparation of the three units under Baden Project. It was late August, 1987 before construction (excavation) began on Baden Project, approximately four weeks after the Parklands Project had started. The Construction Manager of The Bluff site was put in charge of the Baden site at the end of September, after the log houses were substantially completed. Some of the materials (floor and roof trusses) were delivered to the site before excavation began. The owner of the unit approved in July under the Parklands Project complained about the delay in construction start (early October). His house was approved first but built last.

The Construction Manager felt that self-help had some negative effects on Baden's construction schedule, but only because of the low skill level of the clients. The Construction Manager did not find worker turn-out to be a problem.

## 9. Training and Skills

According to the Construction Manager, three of the clients had few skills prior to the construction of the Demo houses. Most clients credited the Construction Manager with their improvement in skills. One client credited his skill improvement mainly to his own work experience and his participation in the 1986 Demo Project. All clients felt they learnt little, if anything, from each other since there was little cooperation between client households.

## 10. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 1500 | 1500 | 1.6 |
| land | 0 | 0 | 0 |
| fees & permits | 200 | 0 | 0 |
| construction manager | 5000 | 6870 | 7.2 |
| construction manager exp. | 3000 | 0 | 0 |
| tools | 1500 | 236 | 0.2 |
| materials package | 81300 | 72995 | 76.4 |
| extra freight costs | 2300 | 0 | 0 |
| equipment rentals | 1000 | 331 | 0.3 |
| labour contracts | 20980 | 12758 | 13.4 |
| miscellaneous | 4450 | 814 | 0.9 |
| Total | 121230 | 95504 | 100.0 |
| Other Contributions: | | | |
| Clients | | 100 | |
| CMHC | | 9500 | |
| Est.Actual Total Cost | | 105104 | |
| Land & Services (Deduct) | | 0 | |
| **Est.Net Construction Cost** | | **105104** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 121230 | 31835 | 1008 | 31.58 | 340 |
| Net Constr.Costs | 105104 | 35035 | 1008 | 34.76 | 374 |

**11. Construction Quality (See also the Parklands Project)**

The foundation of one of the four units had not been square, but the fault was corrected. Some crawl space vents had yet to be installed. Frost appeared on some exterior wall/floor surfaces in two units during extremely cold weather, suggesting inadequate insulation or excessive air infiltration through some floor/wall assemblies. There were signs of excessive heat loss through some window frames, and icicles forming on the sills.

Most caulking and painting/staining jobs had not yet been done. There was no flashing over windows and doors, and some fascias remained to be installed. Most doors were not installed properly, making them hard to open and close. There were excessive gaps between siding and soffits which should be covered with trim and caulked. Condensation has caused most of the insulated steel door hinges to rust, leaving rust stains on the linoleum. Weatherstripping of one door had to be replaced. Some wall panelling was damaged. The linoleum on the living room floor of one unit had lifted at the seams, possibly because of excessive floor deflection.

The ceiling of one unit was stained around the chimney collar and the stove pipe, suggesting there was a leak at the chimney flashing on the roof. The location of the chimney and the wood stove in one unit had not been coordinated, so that elbow connections were required.

**12. Views on the Project**

Of the four communities that were allocated 1987 Demo houses in Manitoba, two of them, at Baden and Red Deer Lake, were also the recipients of 1986 Demo Projects. This repetition was mainly due to Operational Guidelines that specified that there should be no Section 40 houses in the targeted community. The Branch had run out of other suitable communities if it was to deliver the program on time.

If the program's time frame could be extended to two years for remote communities with no road access, then more communities could be considered. Materials could be delivered in January, via winter roads, and protected from the elements till construction start in spring.

Pilferage was a problem on this project, and the development of an effective and inexpensive I.D. system would help to discourage it.

CMHC strongly believes that Demo and Section 40 programs do not mix, since the community would not accept two classes of residents: those who pay rent and those who do not. However, if the Demo Program is treated as one of the subsidized housing options under regular RNH programs, potential clients will be counselled and chan-

nelled to the most appropriate option. This would also allow the Demo Program to be expanded to cover rehabilitation of existing Section 40 and substandard housing. Clients who fail to fulfill their labour input obligation could then be disqualified from the Demo Program and have their houses reassigned to other willing households.

CMHC was doing lots of "hand-holding" for all 1986 and 1987 Demo Projects, thus overextending its staff resources. The Branch has no intention of spending as much staff time on future Demo Projects. It was the intention of the L.O. to have Construction Managers on site to take charge of construction management, training and client motivation. However, the L.O. so far has not been able to find such qualified persons without exceeding the Demo budget.

The Parklands Project demonstrated that log houses can be delivered successfully under the Demo Program. However, no log construction will be used in 1988. This is because the L.O. is doubtful of the longevity of log houses given the generally high humidity in these houses and poor maintenance habits of the clients. The other factor is the high cost of CMHC staff supervision. A financial analysis of the 3-bedroom log house in The Bluff and the same 3-bedroom stick-built house in Baden/Red Deer Lake prepared by the Branch indicated an approximate 40% increase in Branch time and 10% increase in material costs with log construction. Most homeowners have no preference for either form of construction, although some like the appearance of log houses better. Log houses are not very common in the three communities and most existing log houses in the area are poorly built and not well maintained.

Local suppliers and the MMF should be encouraged to bid on a complete project package that includes pre-cut three-stage materials delivery, as well as the contracting of a Construction Manager and all necessary subtrades, and using client and volunteer labour. Each project should be self-contained, requiring minimum assistance from CMHC. It is common knowledge that locally based non-governmental organizations and private enterprises get better prices and results from subtrades and material suppliers. These savings could be passed on to the CMHC Demo Program. However, unless Construction Managers have more control over client participation, this arrangement might not work. The Construction Manager for Red Deer Lake would not accept the job again if similar work crews were used. Before accepting the job, he would want to talk to each client to assess their level of participation.

The package deal proposed by ADD-ON Buildings Ltd. (refer to Garson Lake Project, Views on the Project), where the supplier used his own crew to erect the basic shell of the house, received mixed reactions. Some felt that the Demo homeowners needed most help at the finishing stage of the house instead of at the rough framing stage. With poor finishing workmanship, the house will look bad and cheap no matter how well built the structure is. Also, the homeowners' involvement with the building of their houses would be minimal if a construction crew were used.

The Program Officers were given a relatively free hand to run the Demo Projects on site. The Program Officer for Parklands and Baden found that the three com-

munities are too scattered physically and much time was wasted on travelling to an from each location.

Local opinion was that there is a real need to house single people in the communities. The MMF felt that only Metis should qualify for Demo houses. By assigning Demo units to those most in need, CMHC intensified the tension between Metis and Status Indians in the targeted community. As a result, there was little cooperation between clients and volunteers from these two groups. Where the majority is Metis, local people refused to provide volunteer labour for units that were assigned to Status clients.

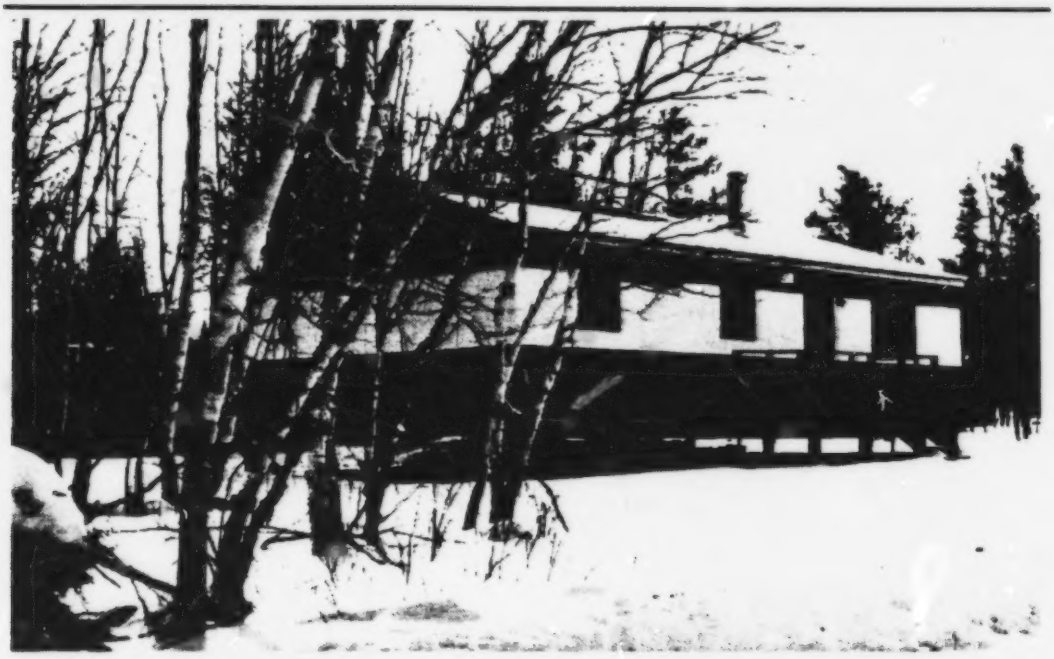
Multi-family units should not be ruled out, as is borne out by the experience in Red Deer Lake, where it cost less to build and heat these potentially energy-efficient houses. ,However, the selection of clients should be most carefully carried out to make sure that households can get along on with each other on a long-term basis. Such an approach could be used to house extended family groups.

One of the Program Officers suggested that a brief meeting should be organized every day before construction began. The Construction Manager could then explain to the work crew what, how and why certain jobs were to be done for that particular day. Any special precautions, techniques, or problems could be brought up then for discussion. This could be a very effective means to transfer information, and the daily session could be an ideal way to instill team spirit and motivate the participants. It could also provide an ideal opportunity to give out maintenance information required for post-construction occupancy.

The major difference between the 1986 and 1987 Demo Program delivery was the date of the construction start. The 1987 Demo Projects got an early start in July which avoided winter construction for the most part. It would be even better if preconstruction activities could begin in February/March, with construction work ready to go in the spring. This would allow plenty of time for clients and volunteers to complete the houses before the onset of winter. Most clients prefer to do construction in the summer. The MMF was not involved in client selection for 1987 Demo Projects because of the problems CMHC had with local MMF representatives in 1986. Given the size of the community, the Branch approach of going to the people directly was a good one as that was the only way CMHC could be sure that every potential client was given a chance to apply for inclusion in the Program.

### 13. 1986 Demo Houses

All three 1986 Demo houses were visited. All were well-kept and had minimum condensation problems after the dehumidistat-controlled ventilation system was installed. All have been painted. The metal floor shields for the wood stoves in two units were bent. Most occupants found the houses very warm and easy to heat. Owners of one of the 4-bedroom units (with crawl space) spent $30 a month on hydro if wood stove was used solely; $65 a month if the electric baseboard was used mainly for heat. The



A well maintained 1986 Demo unit in Baden. The owner has added a sundeck on the back. This is also the unit with floor deflection problems.

owner of this unit added a fence in front of the house and would like to haul in top soil this spring for a vegetable garden.

The best-kept unit, a 4-bedroom unit with open crawl space, had a sundeck added at the back of the house. It has a severe floor deflection problem (at least 3/4"), with gaps between ceilings and walls at interior partitions. The linoleum floor had lifted at the seams near the kitchen/back entry. There were some wiring problems. The owner would like to change the location of the bathroom door so that it will be accessible from the central hallway. He wants to block off the existing door to the kitchen so that more kitchen cabinets can be installed. The existing door would be relocated to open into the central hallway and the back bedroom might be converted into a utility room.

## Project Report: Matheson Island, Manitoba

| | |
|---|---|
| CMHC Project officer: | Bill Leigh |
| Construction Manager: | Bill Leigh (CMHC)<br>Miles Bell |
| Date visited: | February, 1988 |
| Visited by: | Michael Pine |

### 1. Project Overview

The Matheson Island Project consists of two 3-bedroom units with basement and two 4-bedroom units with crawl spaces. Matheson Island is approximately 300 kilometres north of Winnipeg on Lake Winnipeg. The project consists of four single-family dwellings. The population of the Matheson island community is 120 people, or 43 families. The major sources of income are fishing, fish processing and logging. The community has its own sawmill which supplies its needs as well as undertaking commercial activity. The lumber quality is good, but required grading before incorporation into the houses.

The community is accessible during winter by an ice road, and in the summer there is free barge service. There is also a big barge servicing Bloodvein and Princess Harbour. The barge is capable of carrying semi-trailer loads and stops at Matheson Island on request. This service is free during working hours.

The community has its own elected local council. There is a school and two stores which also service Long Body Creek, Bloodvein and the surrounding area. Wood and electricity are used as fuels. The people of Matheson Island are knowlegeable in construction and are capable of building houses with minimium supervision. Land has been handed down from generation to generation.

Dates of Key Project Events are as following:

| | |
|---|---|
| General information sessions | mid-June, 1987 |
| House designs selected | July, 1987 |
| Materials tender awarded | mid-August, 1987 |
| Work begun on site | early August, 1987 |
| First house framed | Sept., 1987 |
| 1st family moved in | end Nov., 1987 |
| Last family moved in | early Dec., 1987 |

### 2 Project Organization

The CMHC Program Officer provided overall project management, coordination and on-site supervision. Since the people of Matheson Island are very familiar with the construction industry and are very capable of building houses, minimium on-site supervision, two or three days a week, was provided by the Program Officer or a local contract person. Separate cost controls were set up for each unit.

The CMHC Project Officer acted as the Construction Manager, except for short periods when a suitable local man was hired in the unavoidable absence of the CMHC officer. The local Construction Manager was recommended by the community as the best carpenter on Matheson Island. He was contracted from November 1 to December 15, 1987. After his contract was over, some homeowners paid him separately to help finish the houses.

The three-bedroom houses were built by skilled and able-bodied homeowners who were well motivated and who required little assistance. The contracted Construction Manager did a considerable amount of work on the four-bedroom houses, as did the CMHC officer.

### 3. Community Selection (See also Parklands Project)

Manitoba is quickly running out of settlements and towns that do not have RNH housing. The prairies have carefully avoided introducing the demonstration houses into settlements served by the RNH program in order to avoid the apparent contrast in benefits. Matheson Island is one of the few communities left without RNH units.

### 4. Client Selection and Characteristics

The Matheson Island Community Council in a letter to CMHC recommended four suitable families for inclusion in the program. Another family had decided to apply for houses in the meantime. The CMHC Program Officer visited and interviewed all applicants. It was decided to assign the Demo units to the first four applicants. The community was in full agreement with CMHC's choice.

The criteria used for client selection were: income, family size, existing housing condition, willingness to work on the construction and residency in the community. All families were found to fit the selection criteria, and their accommodation varied from sub-standard to sordid. One family was composed of four brothers who were living together in a small derelect cabin on the site. The project manager attended the community meeting on June 16, 1987 and carefully explained the basis of the agreement, including the right of CMHC to have first refusal until the house is owned outright by the occupants after 25 years.

Selected clients included:

| Name | Adult | Child | Former Accomodation |
|---|---|---|---|
| A | 4 | 0 | Owned 30 years old cabin in very bad shape |
| B | 3 | 2 | Rented house in Winnipeg |
| C | 2 | 0 | Lived with grandfather |
| D | 2 | 1 | Rented old house which was being repossessed |

The income range of participant families was from $6,000 to $15,000 with an average of $9,000. Income figures for one household were not available.

### 5. Site and Servicing Issues

All the families owned land in the community. Two families pump water from the lake, and two have wells. Two units are served by septic tanks and two have field jet sprays. The community owns a grader and backhoe and provided services free or at minimium cost ($27/hr) to the units. A road was built to one of the units with the help of the community.

### 6. House Designs

The plan of the two 3-BR units with basement was selected by the homeowners from Dueck Building Mart Catalog. The plan was inspected and approved by CMHC. The 4-BR units are of the same design as those used in the Parklands and Baden Projects, which were derived from the 1986 Demo Projects in Long Body Creek.

One of the three-bedroom units in Matheson Island, which is actually larger than the four-bedroom unit.

### 7. Tendering and Materials Package

The contract was awarded to Dueck Building Mart, of Arborg, Manitoba, which delivered the materals in eight lifts. It was necessary to use a local big barge where the fisherman usually have priority, but with prior notice this did not prove to be a difficulty. There were some savings in one case, where a family had assembled a substantial amount of usable lumber from the community mill.

## 8. The Construction Process

The following table provides an approximate breakdown of the relative on-site labour inputs of various participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 50 | 0 | 50 |
| Water supply | 0 | 100 | 0 | 0 |
| Sewage | 0 | 0 | 100 | 0 |
| Electrical hookup | 0 | 0 | 100 | 0 |
| Grading | 0 | 50 | 0 | 50 |
| Footings/found.walls | 0 | 50 | 50 | 0 |
| Framing & sheathing | 50 | 0 | 50 | 0 |
| Insulation & AVB | 0 | 50 | 50 | 0 |
| Drywall/panelling | 0 | 0 | 100 | 0 |
| Drywall finish | 0 | 50 | 50 | 0 |
| Roofing | 0 | 50 | 50 | 0 |
| Siding | 0 | 0 | 100 | 0 |
| Door/window inst. | 25 | 0 | 75 | 0 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 0 | 100 | 0 | 0 |
| Heating & Ventilation | 0 | 100 | 0 | 0 |
| Plumbing & Fixtures | 0 | 50 | 50 | 0 |
| Interior electrical | 0 | 0 | 100 | 0 |
| **OVERALL** | **10** | **40** | **40** | **10** |

The work was organized by the Construction Manager who obtained bids for materials or work as these were required. The availability of heavy equipment on the island was a bonus, as was the pool of skilled people living there. The clients did not work in teams but did come together to help with tasks like raising the wall panels.

## 9. Training and Skills

No training was provided, nor was any required as the people of the island have a tradition of doing their own construction. Where the homeowners lacked skills, family volunteers were available or the Construction Managers helped out.

## 10. Construction Quality

The houses are large and the construction quality is equal to normal builders' standards. A few minor deficiencies were observed in one house: nails popping occasionally through the plaster and damp in two outer corners of the bedrooms. The popping was not at all exceptional and this and some rough patches in the plaster finish can easily be remedied when the house has dried out; the damp was caused by poor flashing and this will be fixed. The same house was exceptionally humid and some discolouration of the natural wood window sills had resulted from melting condensation. Since the neighbouring house of identical design did not suffer from this problem, we checked the dehumidistat in the first house and found that as the problem got worse the homeowner had turned the dial up – it had reached 80% humidity by the time of

the inspection. The principles of the dehumidstat were explained to the owner, it was re-set at 30%, and we look forward to some improvement.

## 11. Project Costs

The project costs were well within the program budget in spite of the large size of the three-bedroom houses, until the non-project costs of CMHC and the clients were added. As is to be expected with remote projects, the cost of site visits or site residence by CMHC administrators is high. Whether these costs will be necessary when the program becomes part of the RNH program repertoire is debatable. Land cost was in fact nil; however the assumption is made that the owners contributed the value of the lots which would cost about $5,000 if purchased by someone from outside.

There is no conventional housing market on the island or in the surrounding areas, so the retail cost of housing cannot be determined, but the best guess of the cost of building a similar house in the area is $87,000. The difference between the demonstration project (net construction) costs and market value is about $41,700, representing the worth of the homeowners' labour or savings to the public purse, depending on your point of view.

The following table provides a breakdown of costs for the project at commitment and final (estimated) stages.

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 1800 | 2000 | 1.3 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 4600 | 1628 | 1.0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 1599 | 1.0 |
| materials package | 102000 | 105440 | 66.5 |
| extra freight costs | 4000 | 274 | 0.2 |
| equipment rentals | 2000 | 3570 | 2.3 |
| labour contracts | 47000 | 43292 | 27.3 |
| miscellaneous | 4000 | 648 | 0.4 |
| **Total Project Cost** | **165400** | **158451** | **100.0** |
| Other Contributions: | | | |
| Clients cash | | 9000 | |
| Clients equity | | 22000 | |
| CMHC | | 11823 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 201274 | |
| Land & Services (Deduct) | | -20000 | |
| **Est.Net Construction Cost** | | **181274** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 158451 | 39613 | 1449 | 27.34 | 294 |
| Net Constr.Costs | 181274 | 45319 | 1449 | 31.28 | 337 |

## 12. Views On The Project

The project went well and the clients, the Construction Manager and the CMHC Winnipeg office were pleased with the results. The three-bedroom houses were very large – probably the biggest houses built under the program. This was intentional: the Winnipeg office wanted to find out how much house they could buy for the money allocated under the program, with the cooperation and material input of the clients. Having established this, it would be prudent not to repeat the experiment elsewhere.

## Project Report: Descharme Lake, Saskatchewan

| | |
|---|---|
| Local Office: | Saskatoon Local Office |
| CMHC Project Officer: | Joyce Grieman |
| CMHC Program Officer: | Ted Eytcheson |
| CMHC Inspector: | Len Hudson |
| Construction Manager: | Gorden Crosson |
| Date visited: | Jan. 26,27 & Feb. 2, 1988 |
| Visited by: | Hai-Toh Lim |

### 1. Project Overview

The project is located 729 kilometres north of Saskatoon, accessible by paved road to LaLoche and then by 100 kilometres of gravel road. The community of Descharme Lake is a remote unincorporated northern settlement. Most of the 47 residents in the community are native. There are approximately 10 houses in the community, more than half of which are of log construction. During about two months in the summer, the community is unoccupied when most of its population goes away on pilgrimage to St. Anne.

Wood is the only source of fuel for heating and cooking, and it is quite readily available from the nearby area. There are no services of any sort in the community. A radio phone is the only means of communication. There is a school, but it is closed as there are not enough students. There are very limited employment opportunities in the community. All except one family are dependent on some form of social assistance, supplemented by hunting, trapping and fishing.

The Descharme Lake project consists of five, three-bedroom log units. This represented a significant improvement and increase in existing housing stock.

Dates of key project events are as follows:

| | |
|---|---|
| General information sessions | early Sept. 1987 |
| Project commitment | mid Sept. 1987 |
| Materials tender awarded | late Sept. 1987 |
| Work begun on site | early Oct. 1987 |
| All foundation completed | late Oct. 1987 |
| All families moved in (anticipated) | end of March 1988 |
| Work ended on site | Spring 1988 |
| Project closed out | March 31 1988 |

### 2. Community Selection

The Saskatoon Local Office took the initiative to identify potential communities using the Criteria for Community Selection set up in the Operational Guidelines, with strict adherence to choosing isolated or remote off-reserve communities with no existing RNH units or other federal subsidized programs. The Federal M.P., Provincial MLA, the Provincial Metis association (AMNSIS), and Province of Saskatchewan (through Urban Affairs, Community Planning, Parks and Renewable Resources, and

the Saskatchewan Housing Corporation) were consulted in making this community selection. The Prairies Regional Office gave approval to communities selected by the Local Office.

### 3. Clients

A council and general meeting took place on September 3, 1987 with representatives from Urban Affairs and Community Planning and the CMHC Local Office staff to discuss the program details. CMHC's presentation and interviews had to be translated into Chipewan by one of the council members since most of the residents speak little or no English. Council approval of the project was received and six applications were completed. CMHC staff discussed the process of client selection and conducted individual interviews at each applicant's home. The selection of clients was based on a point rating system, taking into account family size, core need income threshold, residency in the community, condition of existing housing, overcrowding, clients' ability and willingness to participate in the construction of their houses.

The Descharme Lake project was originally allocated four units. One of the four clients selected by CMHC was replaced after consultation with the council as it was felt that another applicant, a senior, needed the Demo house more. The Regional Office allocated one additional unit to Descharme Lake on November 18 and this was assigned to the rejected applicant.

Four of the five clients have young families and none of the clients have immediate plans to improve their existing housing condition. Two of the families indicated they would eventually build their own houses. The annual income range of participant families varies from $6,800 to $22,000 with an average of $11,300.

CMHC is requiring homeowners to sign a five-year forgivable promissory note prior to occupying the units. Selected clients include:

| Name | Adult | Child | Former Accommodation |
|---|---|---|---|
| A | 2 | 2 | Living with mother |
| B | 2 | 2 | Living with parents |
| C | 1 | 1 | Owns leaky shack |
| D | 2 | 3 | Living in father's house |
| E | 2 | 3 | Living with mother |

### 4. Project Organization

Construction supervision was included in the materials package purchased from the supplier, Uncle Tom's Logs (1987) Ltd. The owner of Uncle Tom's Logs acted as Construction Manager for the first four weeks of the project but hired a friend/relative to take over his duties. This Construction Manager was trained in engineering drafting and has built houses in Alberta. He is a journeyman carpenter but this is his first job in a remote community. All clients found the Construction Manager accessible and helpful.

CMHC provided overall project management and on-site supervision/inspection to Descharme Lake Demo Project. The Program Officer visited the site once a month and the CMHC Inspector visited once a week. CMHC was responsible for items that were not included in the materials package, namely kitchen cabinets and wood stoves, and for dealing with any other matters that arose during the course of construction. Weekly progress reports were filed by CMHC field staff.

The Construction Manager was to keep track of the number of hours put in by each member of the work crew and to prepare up-to-date construction scheduling for CMHC. Labour problems, deficiencies, delays, materials shortages, and any other job site-related issues were reported to CMHC staffs during their weekly site visits so that appropriate actions would be taken after consultation with the Local Office Program Manager.

**5. Site And Servicing Issues**

There is no legal survey for Descharme Lake. Demo Project houses were built on Provincial crown land at no cost after a letter of agreement had been received from the appropriate Provincial authorities. Community Planning prepared a proposed plan for the community and assisted in identifying potential building sites. Clients were involved in site selection and siting of their houses on the lots with advice given by CMHC in certain cases. The houses face either the lake or the road.

The new houses are located close to the existing homes and this has resulted in one of the new buildings being too close to the existing home for fire safety considerations. According to the Homeowner Agreements, the existing houses will be taken down or turned into storage/tool sheds or moved to a different location after the clients have moved into their new houses. It is questionable whether this agreement is enforceable by CMHC in practice.

There is no sewer service in Descharme Lake and outdoor privies are the community norm. Water is carried by bucket from the lake. There used to be a well in the community but it was rendered unusable when contaminated by debris. The only source of power is the diesel generator set up for the school. Since the closure of the school, the generator was purchased and run by the community. The generator is not legally sufficient to supply power to houses in Descharme Lake, but most residents have extension cords to their houses from power poles to run lights, TV's and some freezers. The generator is not very reliable and it costs the community more than $6000 a year to run it. No future power or sewer services are anticipated.

In keeping with the community norm, no plumbing and electrical wiring will be provided in the Demo houses.

**6. House Design**

On suggestion from the Prairie Regional Office and following requests from Descharme Lake and many northern native communities, log construction was selected to demonstrate its feasibility as an alternative method of construction. Pre-manufactured

logs were used and, to reduce costs and for ease of construction, all five units are of the same design. The house plan was chosen from a log catalog Model "Mystic Cabin" by Weyakwin Log Mills. CMHC made modifications to the original floor plan and elevation to better suit the needs of the Demo Project.

The three-bedroom log houses have a floor area of 24'x40' (centre to centre). The design includes three good size bedrooms, a walk-in closet for the master bedroom, and a kitchen/dining/living area. No plumbing fixtures will be provided in the bathroom, which will likely be used as an additional bedroom or a storage room by the clients. All units have 2' unheated and vented crawl spaces.

Descharme Lake log house.

Although the clients were not involved in choosing the house design, all were satisfied with the layout. Three out of five clients would like to have two entrances instead of the one front door provided in the plan. Three out of five clients would like to have another window located along the solid log wall on the kitchen/dining/living area to let in more natural light. The only choice available to the clients, however, was the selection of floor covering. Since all clients found it hard to visualize the plan, one of the clients suggested colour and 3-D graphic should be used in future client presentations.

The PWF sits on poured reinforced concrete strip footing. The 2"x6" studs were insulated with R20 fibreglass batt. No excavation was involved, only top soil was removed and ground leveled for the footings. The soil in the area is sandy and well drained. All houses in the community sit directly on the ground with little apparent frost heaving.

6 mil poly was used as ground cover and air/vapour barrier for the foundation wall. Headers (called band joists in the area), which are commonly left exposed in the area, were covered with 1/2" P.T. plywood, overlapping the P.T. plywood sheathing. This modification and the installation of galvanized flashing for end walls were requested and paid for separately by CMHC.

The wall consists of 10" diameter poplar logs stacked horizontally with a scribed joint between each log. The scribed joints and saddle notches were sealed with butyl sealant tapes and all seams will be sealed with special caulking to prevent water penetration and air infiltration. Logs that were laid end-to-end were notched and filled with foam insulation blocks. The outside edge of the sill logs overhung by 1" the top of the foundation/floor assembly to prevent the penetration of rainwater along this horizontal joint.

Wall openings, interior partitions and trims were designed to allow for log shrinkage and movements over time by adopting common good log building techniques: e.g. splines and trimmers for window and door frame fastening, appropriate clearances above interior partitions, window and door frames, vertical floor-to-ceiling grooves cut in... ...g walls to receive interior studs and 1"x6" pine wall finish, interior studs bolted to the log wall through elongated slots, etc.

Log homes previously built by the potential materials package supplier were visited by CMHC Inspectors and Senior Materials Evaluation Engineer from the National Office to investigate the acceptability of the log construction system. A thermal analysis of the log house was conducted by the National Office and adding of insulation to the log walls was recommended, but this was not done.

The roof is constructed of prefab roof trusses with R40 fibreglass batt insulation. Attic ventilation is provided by 10 soffit and 2 gable vents (with one of the houses having 12 additional gable soffit vents). 6 mil poly was placed under the roof trusses, followed by 1"X4" pine ceiling finish. The gable ends were covered with "pine wall" sheathing.

The wood windows are triple-glazed. The operable windows are of awning type. The exterior door is of insulated steel with an insulated steel storm door with vertical slider. The only heating system provided is a wood stove, centrally located in the house. There is no provision for combustion makeup air. Door undercuts facilitate air circulation to individual rooms. Another chimney will be provided for the clients' cook stove. Each client will be consulted regarding the location of the second chimney.

No plumbing, electrical wiring, plumbing, electrical fixtures, or mechanical ventilation system will be provided. Each household will install their own wood cook stove.

The only other possible appliance would be a freezer. One of the clients would like CMHC to provide the houses with cook stove and bathroom vanity.[1]

## 7. Tendering And Materials Package

CMHC Local Office invited three log suppliers to submit bids for an entire materials package based on floor plan and specifications prepared by the CMHC Local Office. The foundation design of the log houses was to be supplied by the bidders. Uncle Tom's Logs (1987) Ltd., a very small local operation, was the successful lowest bidder. Bids were requested from four wood stove and kitchen cabinet suppliers in the area and were provided outside of the materials package. Meadow Lake Co-Op was the successful lowest bidder to supply cabinets, wood stoves and accessories for the project. CMHC staff visited each supplier prior to awarding the contracts.

The nearest local lumber yard in LaLoche was invited to bid on the Demo Projects but its quotes were too high. Gravel required for the footings was obtained from the local Department of Highways yard. The use of a local sawmill as a source of logs was considered impractical in these northern Saskatchewan communities because of the poor quality of materials and the lack of appropriate skills and technology.

The materials package was delivered in stages by a semi-trailer truck to Descharme Lake. Wood stoves and kitchen cabinets were delivered to site as arranged by CMHC.

The Local Office is considering requiring future bidders to provide performance/surety bonds and labour and materials payment bonds. This might discourage small local suppliers or contractors from participating in the project.

## 8. The Construction Process

The client work team, under the supervision of the Construction Manager, moved from house to house during most stages of the construction with the exception: a client who operated a Department of Highways road grader removed top soil and leveled the building sites for all five units. Interior finishing, painting/staining and caulking of logs, and any other final grading and landscaping will probably be done by individual households. One of the clients works full time and he hired a man to take his place in the work team. The Construction Manager reported that he spent an average of 45 hours a week on the job[2], whereas the clients spent about 25 to 30 hors a week on the job. This is far short of the 50 hours per week pledged by the clients on their application forms.

The following table breaks down the labour that went into the project:

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1 CMHC reports that vanities have now been provided

2 Since he was living in the community, his actual time on the job was difficult to determine.

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers[3] |
|---|---|---|---|---|
| Site preparation | 0 | 0 | 100 | 0 |
| Water supply | 0 | 0 | 0 | 0 |
| Sewage | 0 | 0 | 0 | 0 |
| Electrical hookup | 0 | 0 | 0 | 0 |
| Grading | 0 | 0 | 100 | 0 |
| Footings/found.walls | 20 | 0 | 65 | 15 |
| Framing & sheathing | 20 | 0 | 65 | 15 |
| Insulation & AVB | 0 | 0 | 70 | 30 |
| Drywall/panelling | 0 | 0 | 0 | 0 |
| Drywall finish | 0 | 0 | 0 | 0 |
| Roofing | 20 | 0 | 55 | 25 |
| Siding | 0 | 0 | 0 | 0 |
| Door/window inst. | 20 | 0 | 55 | 25 |
| Int. Fin, exl.drywall | 5 | 0 | 60 | 25 |
| Cabinetwork | 20 | 0 | 55 | 25 |
| Heating & Ventilation | 0 | 0 | 0 | 0 |
| Plumbing & Fixtures | 0 | 0 | 0 | 0 |
| Interior electrical | 0 | 0 | 0 | 0 |
| Other-wood stove inst. | 20 | 0 | 55 | 0 |
| **OVERALL** | **15** | **0** | **65** | **20** |

There were no volunteers available for the project. However, starting from January 11 this year, six to eight workers paid by Provincial Social Services under the Economic Development Program (E.D.P.) helped to construct the houses. Some of the E.D.P. participants were household members or relatives of the clients. An E.D.P. coordinator was also on site to keep track of the hours worked and progress made by sthe participants. Arrangements were made to allow people to work in the Descharme Lake Demo house construction in lieu of fines or jail sentences received from the court in LaLoche. Due to poor worker turnout, the Construction Manager was also involved in actual construction of the houses.

It was initially estimated by the materials package supplier and the Construction Manager that the project would take approximately four months to complete (October 1987 to January 1988), assuming a 50-hour week on the part of each homeowner. The construction schedule was revised to reflect a more realistic completion date of early to mid-March, 1988. The delay was due to the following factors: not enough manpower, inexperience of the work crew, lack of motivation of the work crew, unfavourable weather conditions and short daylight hours, and fitting and readjustment problems with the logs. Lack of motivation and manpower shortage seemed to be the major problems holding back the project. According to the Construction Manager, an experienced crew can put up the log walls in 1 1/2 to 2 days, whereas in Descharme Lake Project, only one or two units had the log walls up in 3 days; the rest of the units took longer, mainly due to lack of manpower.

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3 These "volunteers" were actually paid under the EDP program.

There was no problem with crating and delivering of the materials package. Dimensioning of the logs was quite accurate. Precut logs were pre-numbered according to the erection sequences. The Construction Manager was equipped with elevations showing the exact location of each logs, and little time was wasted in finding the right logs.

Building materials were stored on site. Some tools and smaller building materials were stored in the community trailer. Once the houses were closed in, materials were stored in one of the units. Since this is a small community with nearly everybody getting a Demo house, there was minimum pilferage. Two prefab chimney sections were damaged when the Construction Manager fell off the roof. CMHC stressed very strongly to the clients that they were not insured for job site injuries. Extra workers were required to lift the logs in place to prevent injury.

## 9. Project Costs

Approximate initial and final costs are shown in the following table.

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est.) | Final % |
|---|---|---|---|
| pre-dev. expenses | 0 | 0 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 0 | 14000 | 0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 1500 | 0 |
| materials package | 0 | 175300 | 0 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 0 | 0 | 0 |
| labour contracts | 0 | 0 | 0 |
| miscellaneous | 0 | 16700 | 0 |
| **Total Project Cost** | **0** | **207500** | **0** |
| Other Contributions: | | | |
| Clients | | 1200 | |
| CMHC | | 33000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 241700 | |
| Land & Services (Deduct) | | 0 | |
| **Est.Net Construction Cost** | | **241700** | |

Log construction generally costs more than conventional stick-built houses but in the case of a number of houses with one basic, simple shape and of consistent size (as in Descharme Lake), the cost is quite comparable. The increase in materials cost (logs) is offset by savings in the cost of siding, drywalling and wall insulation. Since this is a self-built project, labour cost is of no consequence. In return for their extra labour, homeowners get a more durable house and a house form they consistently request.

MUP figures indicate that a 3-bedroom, stick-built house in this area would cost $92,000. According to the Municipal Advisor at Buffalo Narrows, a similar house would have cost $70,000 to $90,000 if the conventional stick-built method had been used.

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 207500 | 41500 | 960 | 43.23 | 465 |
| Net Constr.Costs | 241700 | 48340 | 960 | 50.35 | 542 |

## 10. Training and Skills

Most of the construction training was provided on-site in groups by the Construction Manager. All clients have some building skills, some have taken carpentry courses, and some had built houses before the Demo Project. One client, who is a carpenter, felt that he did not learn anything new or improve his construction skills from working on this project. However, according to the Construction Manager, all clients have improved their skills moderately. Most clients credited the Construction Manager for their improvement in skills. The CMHC Program Officer suggested that the work crew should be broken up into smaller groups to speed up the construction.

## 11. Construction Quality

None of the houses was substantially complete during the visit by the monitoring consultant. All except one had windows and doors installed and the roof on, but interior work was not yet complete. Grooves were being cut in the log walls in one unit to receive interior partitions. The construction quality of two of the units was comparable to any house built by a contractor's crew. Two other units needed adjustments on site due to log fitting problems. One of these units was still out of plumb by at least 2" and CMHC is seeing to it that the problem is corrected before the project is closed out. This problem unit also suffered from manpower shortage as the client, who works full time, had problems hiring a replacement worker to take his place in the homeowner work team. As a result there were times when nobody was actively working on this house.

The quality of the white poplar logs was good. The fitting problems of the two units resulted from technical problems at the mills (inaccurate saddle cuts). The problems were solved and the subsequent log packages delivered had no fitting problems.

The PWF foundation was of average quality for all units. No drainage sump was provided since the site has sandy soil. Excavation for the foundation was omitted since local building practice suggested no apparent frost heave problem. In some units, PWF sheathing joints lined up vertically with the joints of the band joist cover instead of being staggered to provide better weather protection.

There were gaps between logs and house corners in most of the houses. The Construction Manager planned to stuff the gaps with flexible foam or fiberglass insulation

before caulking is applied to all the seams inside and out. A wood filler piece might be required to fill some of the wider gaps before caulking can be applied. There was just sealant tape and caulking under all base course logs instead of proper sill insulation. The sill log of one unit did not overhang the top of the floor assembly, and galvanized flashing had been provided to correct this deficiency. Dowelling was not provided along the length of the logs to control drifting and rolling. CMHC Local Office felt that the added expense and effort was not necessary due to local wind condition and the relatively short length of unsupported log wall. According to Mr. D.E.R. Anderson, the senior materials evaluation engineer from the National Office, it would cost roughly $10 in materials and two hours labour for each house to install the dowelling. No deep groove had been cut along the top of the logs to control checking and to aid drying of the logs.

The quality of AVB was somewhat below standard. The header at the foundation wall was insulated with fiberglass batts, but AVB was omitted. The AVB on the ceiling was not sealed at the edges and there was not enough overlapping at the joints. AVB at chimney openings in the ceiling was not well sealed. It must be stressed that most houses were at a stage where AVB was covered over or had not been installed during the visit by the monitoring consultant. Caulking had not been applied in all units. It was recommended that caulking of the exterior horizontal joints be postponed for two years after the construction of the log houses to allow sufficient time for the log walls to settle. Since the units must be completed by March 31, 1988, the Local Office felt that this wait was impossible and all caulking and sealing will be done in the spring 1988.

Due to high moisture generation in the household, condensation will be a problem without some form of active ventilation. Mechanical ventilation is not feasible since there is no power. A natural ventilation system similar to those used in Ontario Indian reserve housing should be investigated.

Overall, with proper supervision, self-building does not seem to affect the quality of construction. In fact, the Demo Project was subject to more than the standard five inspections that a regular RNH house would receive. This is because the CMHC Inspector visited the project site on a weekly basis. The violations to the 1985 National Building Codes (health and safety issues only) are as follows: no plumbing, no electricity, no wall insulation, and no provision for mechanical air change requirements.

## 12. Views on the Project

The Descharme Lake 1987 Demo Project has proven once again the technical feasibility of the program. It has shown that despite some problems and, regardless of management approach, the Local Office can deliver their allotted number of good quality housing units on time and within budget, even with unfavourable weather conditions and inexperienced client work crews. Emphasis should now be put on fostering the spirit of the Demo Program and getting people to help themselves. Providing good and affordable housing should be part and parcel of community development.

The CMHC L.O. conducted an investigatory trip to Descharme Lake on July 22, 1987, but the client selection did not get underway till early September. This delay was due to the fact that the community is deserted for two months in the summer while its people are away on an annual pilgrimage. This delay in client selection contributed greatly to the delay in construction start.

The most disturbing fact about the Descharme Lake Demo Project is the lack of volunteers in such a small and supposedly close-knit community. This lack, coupled with the lack of motivation and enthusiasm on the part of homeowners, lead one to wonder if the choice of community and clients was the most appropriate. Descharme Lake has no community infrastructure, no services, no employment opportunities and no strong community organization. The Demo houses substantially improve housing standards and conditions in the settlement, but the community still does not (an cannot) solve the problems of water, sewage, electricity and other essential services.

The Local Office felt that since the people of Descharme Lake choose to live there, the Corporation should try to improve their housing conditions. The Municipal Advisor for the area was very much in favour of the Demo Program and thought their choice of community was a good one. However, there were others in the area who felt CMHC should spend more time researching and investigating potential communities and clients to make sure that Demo houses go to those most in need and most willing to help themselves.

Allowing clients to hire someone to build their houses defeats the purpose of self-build project. Nevertheless, this kind of arrangement allows the working poor to take advantage of the Demo program in a community without regular RNH programs. Most clients interviewed still do not believe that they will own the Demo houses five years down the road despite constant assurances from CMHC staff. They were afraid that they will end up paying rent to CMHC and doing all the construction work for nothing. Much of this misunderstanding is due to different cultural values and the need for an interpreter. In any case, if the clients do not feel they own the houses, it is doubtful they will maintain the units with the tender loving care of a proud homeowner. That attitude is especially crucial in this case as log houses by their nature require lots of maintenance.

The CMHC Program Officer would like to see the standard of maintenance spelled out clearly in the Homeowner Agreements and a requirement for annual house inspection by CMHC. Thus, if it is found in any case that house maintenance is not up to prescribed standards, that particular year should not be credited towards the forgivable loan period. However, standards of maintenance are quite unenforceable, as it would be politically unpopular to take back the house, or even to extend the forgivable loan period.

The log supplier will take part in future Demo projects again provided worker input can be enforced; alternatively, contract conditions and costs should be adjusted in the supplier's favour if the guaranteed worker input does not materialize.

The Local Office wants to wait and see how the Descharme Lake log houses perform for a few years before proceeding with building more log houses. The performance of the Uncle Tom's log houses depends heavily on the performance of caulking and sealing compounds. Moisture/high humidity problems and the airtightness of log houses with no electricity, plumbing and mechanical ventilation have to be monitored over the years.

As in the Garson Lake project, CMHC did not have a direct contractual relationship with the Construction Manager. The materials package included $14,000 for supervision and the supplier in turn contracted the Construction Manager to carry out the supervision at a cost of $8,000. Both the CMHC Program Officer and the Construction Manager expressed dissatisfaction with this arrangement due to the confusion of authority and responsibility on site. The presence of the E.D.P. Coordinator on site further undermined the creditability of the Construction Manager.

CMHC would prefer to hire construction managers directly for future projects, but the Demo Project budget does not have enough funds to attract qualified persons to the position. As a result, too much supervision time is required of CMHC staff. Since the limited Demo Program budget does not allow for full-time staff positions, CMHC staff are in danger of becoming overextended due to the extra time and effort given to Demo Program.

Due to the remote location of Garson Lake and Descharme Lake from Saskatoon, on every weekly field visit, the Branch's staff spent more than 2/3 of their time travelling, without taking into account delays due to poor weather conditions. This is a very expensive way of utilizing PD's even if this supervision cost was not charged to the Demo Projects (only costs incurred by air travel were charged to the Garson Lake Project). A more cost-effective arrangement would result if more responsibilities could be given to a locally-based construction manager.

## Project Report: Garson Lake, Saskatchewan

| | |
|---|---|
| CMHC Program Manager: | Joyce Grieman |
| CMHC Program Officer: | Ted Eytcheson |
| CMHC Inspector: | Len Hudson |
| Construction Manager: | Glen Janvier |
| Date visited: | Jan. 27 & Feb. 3, 1988 |
| Visited by: | Hai-Toh Lim |

### 1. Project Overview

The project is located 40 kilometres southwest of La Loche, which is 644 kilometres from Saskatoon. Accessibility is by winter road, plane, or by all-terrain vehicle over a narrow path on the muskeg. The community of Garson Lake is a remote, unincorporated northern settlement. The majority of the 84 residents in the community are native. There are approximately 17 houses in the community, some of which are of log construction. During about two months in the summer, the community is unoccupied as its entire population is away on pilgrimage to St. Anne.

The only source for heating and cooking is wood which is quite readily available from the nearby area. There are no sewer and water services in the community. The only source of power is a diesel generator for the school. A radio phone is the only means of communication. There are very limited employment opportunities in the community and most families are dependent on some form of social assistance, supplemented by hunting and trapping.

The Garson Lake project consists of three 2-bedroom, one 3-bedroom and two 5-bedroom units. This represented a significant improvement and increase in existing housing stock.

Dates of key project events are as follows:

| | |
|---|---|
| General information sessions | early Sept. 1987 |
| Project commitment | mid-Sept. 1987 |
| Homeowners selected | mid-Sept. 1987 |
| Materials tender awarded (Prefab "kit") | late Oct. 1987 |
| Work begun on site (foundation) | mid-Sept. 1987 |
| First foundation completed | end of Sept. 1987 |
| Prefab "kit" delivered on site | early Dec. 1987 |
| Start erection of 1st house shell | Dec. 6, 1987 |
| 1st house shell erection completed | Dec. 12, 1987 |
| All families moved in (anticipated) | End of March, 1988 |
| Project closed out | March 31, 1988 |

### 2. Community Selection

The Saskatoon Local Office took the initiative in late June, 1987 to identify potential communities, and they used the Criteria for Community Selection set up in the Operational Guidelines. The Guidelines were strictly adhered to with regard to choos-

ing isolated or remote off-reserve communities with no existing RNH units or housing from other federally subsidized programs. The Federal M.P., Provincial MLA, Provincial Metis association (AMNSIS), and the Province of Saskatchewan (through Urban Affairs, Community Planning, Parks, Recreation and Culture, and the Saskatchewan Housing Corporation) were consulted in making this community selection. The Prairies Regional Office gave approval to communities selected by the Local Office.

Garson Lake used to be a more viable community. The Province of Saskachewan was not too keen on CMHC building more houses in Garson Lake since it is a no-growth settlement.

### 3. Clients

A council and general meeting took place on September 2, 1987 with representatives from Urban Affairs and Community Planning and the CMHC Local Office staff on hand to discuss the program details. CMHC's presentation and interviews had to be translated into Chipewan by one of the council members since most of the residents speak little or no English. Council approval of the project was received and seventeen applications were completed. CMHC staff discussed the process of client selection and conducted individual interviews at each applicant's home. The selection of clients was based on a point rating system, taking into account of family size, core need income threshold, residency in the community, condition of existing housing, overcrowding, and clients' ability and willingness to participate in the construction of their houses.

Selected clients include:

| Name | Adult | Child | Former Accommodation |
|---|---|---|---|
| A | 5 | 7 | Owned log house, rotted found. |
| B | 2 | 6 | Lived with parents |
| C | 2 | 2 | Owned old leaky trailer |
| D | 2 | 1 | Lived in a house that belongs to the community |
| E | 2 | 1 | Owned log house, poor condition |
| F | 2 | | Owned old log house w/rotted foundation |

One of the selected clients, who was assigned a two-bedroom unit, decided to withdraw the application and an alternative client was selected. The unit was then assigned to a senior on the understanding that her relatives were going to build it.

Two of the six homeowners are old age pensioners. The annual income range of participant families is from $8,000 to $17,000 with an average of $12,400. Two of the clients have big young families and some of the older clients are bringing up their grandchildren. None of the clients have immediate plans to improve their existing housing condition. CMHC discussed and explained the Homeowner Agreements and homeowners will sign a five-year forgivable promissory note prior to occupying the units.

## 4. Project Organization

CMHC L.O. provided overall project management and on-site supervision/inspection for the Demo Project. This included contract administration, coordination of prefab "kits" delivery from La Loche to the site, and scheduling. CMHC was responsible for items/materials that were not included in the materials package, e.g. foundation, wood stoves and any other matters that arose during the course of construction. The Program Officer visited the site once a month and the CMHC Inspector visited the site once a week. Weekly progress reports were filed by CMHC field staff.

Due to remoteness of and poor access to Garson Lake, a "kit" type of construction developed by Add-On Buildings Ltd. of Edmonton is being used in this project. Three building kits were selected by CMHC N.O. through a nationwide tender call in 1986. The L.O. chose Add-On Buildings Ltd. since it is the nearest supplier. The foundation design was obtained from the Regional Office.

Methy Construction of La Loche was contracted by the CMHC L.O. to provide supervisory services, and it assigned one of its employee to act as Construction Manager on site. Methy Construction is owned by the town of La Loche and has excellent reputation in the area. Methy Construction had complained in the past that CMHC does not use local people for their regular RNH projects. Thus the company was approached by CMHC this time to serve as Construction Manager for Garson Lake Demo project. At first, Methy Construction was not interested in the job as there was no profit to be made from the fee offered by CMHC. Two other prospective local area candidates were approached by CMHC but both declined the offer of this position. CMHC had a hard time finding qualified persons willing to accept the position and Methy Construction was approached again to reconsider the position. Methy Construction finally accepted the position as a make-work project for their staff during a slow construction season.

The Construction Manager has worked for Methy Construction for a long time and has considerable construction experience and education; however, the Construction Manager had no prior experience with building kits. Methy Construction had an excellent superintendent to help the Construction Manager out if there were problems at the job site. The Construction Manager hired an assistant to help him carry out his duties. As of the first week of February, 1988, another helper was hired by the Construction Manager to speed up the project progress in the face of poor client turn-out.

The Construction Manager and his assistant, who speak Chipewan, are locals from La Loche. They took up residence in Garson Lake in a house owned by the community. By the last week in February when all outside work was scheduled, the Construction Manager and his helpers were planning to return to the project twice a week to show the clients how to finish the interior.

The owner of the prefab factory and his Production Manager came to Garson Lake at the beginning of the project to coordinate the airlift of the house packages and to instruct and supervise the Construction Manager and his work crews in erecting the basic shells of the building kits.

Labour problems, deficiencies, delays, materials shortages, and any other job site related issues were reported to CMHC staff by the Construction Manager during their weekly site visits so that appropriate action could be taken after consultation with the Local Office Program Manager.

**5. Site and Servicing Issues**

There is no legal survey for Garson Lake. Demo Project houses were built on Provincial crown land at no cost after a letter of agreement had been received from the appropriate Provincial authorities. Community Planning prepared a plan and assisted in identifying potential building sites. Clients were involved in site selection and siting of their houses on the lots with advice given by CMHC in certain cases.

The new houses are located close to the existing homes; this has resulted in some of the new units being too close to the existing ones for compliance with fire safety regulations. According to the Homeowner Agreements, the existing houses will be taken down or turned into storage/tool sheds or moved to a different location after the clients have moved into their new houses, but it is questionable whether this agreement is in practice enforceable by CMHC.

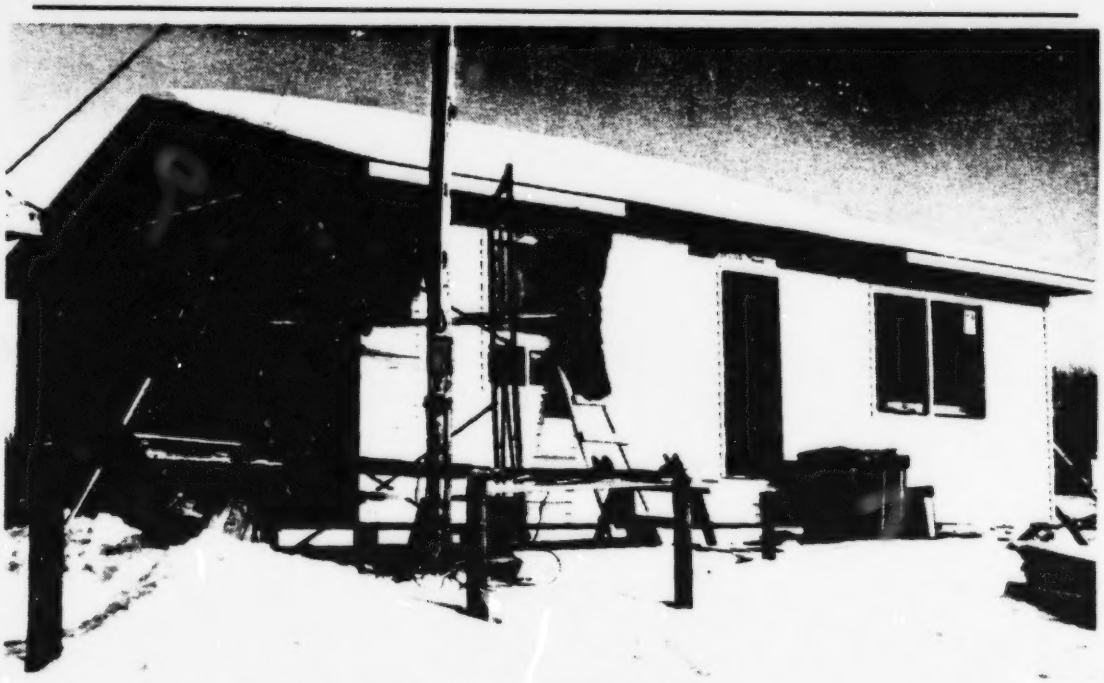
There is no sewer service in Garson Lake and outdoor privies are the community norm. Water is carried by buckets from the lake. The water is of poor quality as the lake is very shallow and a community well has now been funded for installation in the near future. The only source of power is a diesel generator set up for the school, and this is not legally sufficient to supply power to the houses. Nevertheless, most residents run extension cords to their houses from power poles to run lights, TV's and some freezers. No future power and sewer service is anticipated.

In keeping with the community norm, no plumbing and electrical wiring will be provided to the Demo houses.

**6. House Design**

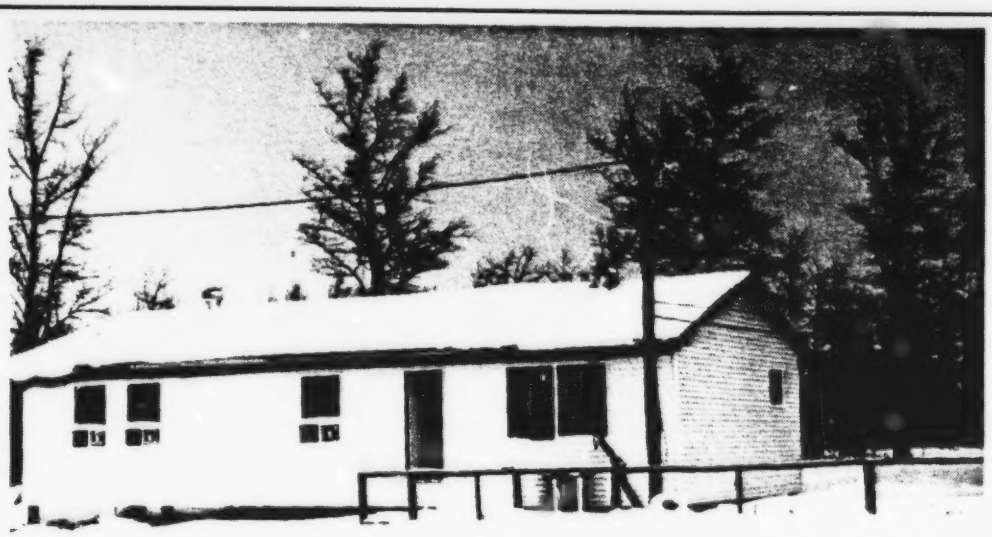
All house design were provided by Add-On Buildings Ltd. Due to the kit nature of the construction packages, there was no design input from the clients except for limited choices of colour for siding, soffit and fascia.

The three 2-bedroom units each have a gross floor area of 32'x24'(768 sq.ft.), the one 3-bedroom unit has an area of 38'x24' (912 sq.ft.) and the two 5-bedroom units have area of 48'x24' (1152 sq.ft.). Due to the modular nature of the design, the kitchen/dining and the living room are of same size for the three unit types. No plumbing fixtures will be provided in the bathroom, and it will likely be used as a storage room by the clients. All units have open crawl spaces. Although the clients were not involved in choosing the house design, all were satisfied with the layout. One client wanted to have a larger kitchen and another wanted a coat closet with shelves in the living room; the latter request has apparently now been fulfilled. Interviews also brought out reservations about the appearance of the interior wall finish, and the Local Office subsequently reported that interior panelling has now been provided.



Two-bedroom unit in Garson Lake

Three-bedroom unit in Garson Lake



Five-bedroom unit in Garson Lake

Foundations were originally included in the Add-On materials packages. To save time and money, CMHC L.O. decided to take responsibility for having the foundation in place to receive the house packages. A foundation design similar to that used in the 1986 Demo project in Long Body Creek was adopted. Three rolls of 6"x6" P.T. posts were supported by P.T. footing pads at a depth of 6' below grade. Diagonal P.T. bracing was provided at the four corners of the house. 3-ply laminated 2"x10" beams were supported by the posts, two on the edge and one on the centre of the house. The prefab floor panels were then simply supported by the beams.

Floor, ceiling, roof, exterior walls, interior partitions and corner components were prefabricated. Triple-glazed vinyl clad wood windows with sliders, insulated steel exterior and hollow core wood interior doors were prehung. The small windows in the kitchen and bathroom are of casement type. Exterior walls and ceiling panels were provided with a pre-built 6 mil vapour barrier which was covered with sturdi-wood interior wall finish. To facilitate easy installation of fiberglass insulation (R24) and floor AVB on site, the floor panels came with sturdi-wood at the bottom and no vapour barrier Interior partitions (studs, plates and wall finish) and fascia boards were pre-cut. 5/8" Type X fire-rated drywall was supplied for cladding of the walls and ceilings in the stove area. The balance of all building materials for the houses and all fasteners, hardware, caulking and tools needed for the on-site completion of the houses were included in the house packages.

The roof panels consisted of 2"x6" rafters and 3/8" sturdi-wood sheathing, supported on pony walls on the ceiling assembly. The load was supported by a centrally located spine wall and the two side walls. R40 fiberglass batt insulation was laid on the ceiling. The exterior wall panels consist of 2"x4" studs, AVB and 1/4" sturdi-wood on the inside face of the walls. 1.5" styrofoam rigid insulation was installed on the exterior face of the walls on site, resulting in a total of R19.5. Building paper was used as an air barrier over the rigid insulation, followed by horizontal vinyl siding.

The only heating system provided is a wood stove, centrally located in the house. There is no provision for combustion makeup air. Door undercuts and transom openings facilitate air circulation to individual rooms. Secondary chimneys will be provided for the clients' cook stoves. Each client will be consulted regarding the location of the second chimney. No plumbing, electrical wiring, plumbing and electrical fixtures, or mechanical ventilation system will be provided. Each household will install its own wood cook stove, the only other possible appliance being a freezer. Two ventilation turbines a house and the soffit vents (included in the house packages) provide the necessary venting for the attic space.

**7. Tendering and Materials Package**

CMHC National Office was in charge of the tendering process to select the kit building systems in 1986. Add-On Buildings Ltd. was commissioned by the Project Implementation Division of the N.O. to develop a "kit" for an easy on-site erection of a typical 2-bedroom unit in February, 1987. After initial presentation, and various changes and contract negotiations with the L.O., Add-On Buildings Ltd. was contracted by the CMHC Local Office on October 20, 1987 to supply six complete house packages on various sites in Garson Lake. Add-On Buildings Ltd. provided the plans, specifications and list of materials for the house packages. Add-On Buildings Ltd. was responsible for the delivery of the house packages from Edmonton to La Loche.

The Local Office invited bids from local suppliers for foundation materials, wood stoves and kitchen cupboards. These were provided outside of the packages. The supply of paint was deleted from the packages to prevent damage due to cold weather.

Originally the L.O. was to arrange transportation of the house packages from La Loche to Garson Lake on the summer road (on muskeg), but further investigations indicated that this was not possible. Rather than waiting for winter roads to allow transportation, the L.O. arranged for the house packages to be delivered by helicopter.

The 43 packages for six complete houses were delivered to La Loche on December 2, 1987 by four semi-trailer trucks. The size of each package was approximately 8'x12'x3', weighing not more than 4,000 lbs. which is the weight limit of the helicopter. The maximum air transport capacity for one helicopter was 10 packages a day. The delivery of house packages by helicopter began on December 3, and delivery was completed on December 10.

CMHC arranged with Add-On Buildings Ltd. for proper sequences of packages to be flown to Garson Lake. A sketch plan was prepared to indicate the placement of house packages for each unit in Garson Lake. The packages were to be placed in front of each house by helicopter. Some, due to site obstructions, had to be moved to the respective building lots by skidoo and truck.

Materials other than those included in the home packages by Add-On were purchased from local supplier (Meadow Lake Co-Op) and delivered to La Loche. Foundation materials were delivered to site by float plane and then transported to shore by boat. Wood stoves were transported to site via winter road and the rest of the materials were delivered to and stored in the airport hangar in La Loche and transported to the site by plane. Some chimney sections and accessories were delivered to Descharme Lake by mistake. This resulted in a delay in installing wood stoves.

## 8. The Construction Process

The erection of the basic house shell, which began on December 8, 1987, was supervised by an Add-On Buildings Ltd. Production Manager. The Production Manager remained in Garson Lake till most of the erection was complete, except for the installation of ceiling panels for one unit and roof panels for five units. The Construction Manager from Methy Construction supervised the balance of the work. CMHC L.O. staff, who were responsible for the completion of the on-site work, provided constant overall coordination and inspection of the project. The clients will be mainly responsible for the interior finishing work on their own houses.

The client work team, under the supervision of the Construction Manager, moved from house to house during most stages of the construction, with the exception of foundation excavation. One 2-bedroom unit lagged behind the rest of the units due to little input by the relatives of an elderly homeowner. The construction of this unit came to a standstill while CMHC and the community tried to persuade the relatives to work on the house. The homeowner's relatives did not cooperate with other clients in the project; as a result, the others did not want to help build this unit. Starting on January 27, 1988, the construction of the unit resumed, with the help of the client's relatives.

There were no volunteers available for the project. Due to poor weather conditions, the lack of manpower, and the poor skills and motivation of the work crew, the project progressed much more slowly than had been scheduled. The prefabricated panels, especially the roof panels, were quite heavy, requiring six workers for installation. According to Add-On's experience, it should take only a day for a work crew of four to put up the basic shell for the unit. However, it took at least three days (the best case) and six or more crew members to erect a 2-bedroom shell in this project. Due to the lack of manpower, the Add-On superintendent, CMHC staff, the Construction Manager and his hired helpers all provided some physical labour to the project.

The following table provides an approximate breakdown of the relative on-site labour input of the various participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 10 | 0 | 90 | 0 |
| Water supply | 0 | 0 | 0 | 0 |
| Sewage | 0 | 0 | 0 | 0 |
| Electrical hookup | 0 | 0 | 0 | 0 |
| Grading | 0 | 0 | 0 | 0 |
| Footings/found.walls | 95 | 0 | 5 | 0 |
| Framing & sheathing | 50 | 0 | 50 | 0 |
| Insulation & AVB | 50 | 0 | 50 | 0 |
| Drywall/panelling | 50 | 0 | 50 | 0 |
| Drywall finish | 0 | 0 | 0 | 0 |
| Roofing | 50 | 0 | 50 | 0 |
| Siding | 75 | 0 | 25 | 0 |
| Door/window inst. | 0 | 0 | 0 | 0 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 0 | 0 | 100 | 0 |
| Heating & Ventilation | 0 | 0 | 0 | 0 |
| Plumbing & Fixtures | 0 | 0 | 0 | 0 |
| Interior electrical | 0 | 0 | 0 | 0 |
| Wood stove insta. | 50 | 0 | 50 | 0 |
| Other | 0 | 0 | 0 | 0 |
| **Overall** | **70** | **0** | **30** | **0** |

The 43 house packages were supported by 2"x4" base braces (added at the request of CMHC) and wrapped in woven polyethylene. Some of plastic wrap and support braces were damaged on arrival from Edmonton but were all repaired by the Add-On superintendent. One package came apart during transportation and had to be set down on the frozen lake. Three bundles of shingles and fourteen styrofoam sheets were lost, but a 10% surplus materials had been included in the house packages so the loss created no problem. The package was repaired and transported to site. CMHC arranged for an overnight security guard for the house packages at the La Loche airport until all packages were flown to Garson Lake. CMHC also arranged for the use of the community storage shed to store tools and some building materials. One window was damaged when a wall panel fell over on the ground. CMHC L.O. ordered a replacement in Saskatoon and brought it to the site by plane during one of their routine site visits.

## 9. Project Costs

The kit supplied by Add-On Buildings Ltd. costs $21/sq.ft. According to L.O., the project would have cost 20% to 25% less to build if the conventional stick-built method had been used. Prefab "kits" might be cheaper if the packages were prefabricated, pre-cut and delivered to site by local supplier instead of purchasing the "kits" from a different province. However, according to economic data derived from the Garson Lake Project by Add-On Buildings Ltd., their cost per square foot for an average 3-bedroom, 920-sq.-ft. turnkey house with P.T. grade beam foundation is $42.40, whereas the minimum cost for the turnkey completion of the same house built by conventional construction methods would be $70.65. According to Add-On's cost comparisons, a reduction of 40% in cost can be achieved in areas where building materials

and skilled labour are lacking, The Construction Manager estimated a comparable 3-bedroom house, built by the conventional stick-built method, would cost $50,000.

Using the MUP figures, a 3-bedroom stick-built house in this area would cost $92,000. The corresponding costs of a 2-bedroom and a 5-bedroom unit would be $87,000 and $102,000 respectively.

The following table shows costs at the commitment stage, and the final estimated costs.

**Table 2: Project Costs, Commitment and Final**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 1800 | 3156 | 1.3 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 18000 | 14000 | 5.6 |
| construction manager exp. | 12000 | 0 | 0 |
| tools | 1500 | 1800 | 0.7 |
| materials package | 160800 | 152052 | 61.1 |
| extra freight costs | 30600 | 49704 | 20.0 |
| equipment rentals | 0 | 0 | 0 |
| labour contracts | 0 | 0 | 0 |
| miscellaneous | 24300 | 28288 | 11.4 |
| **Total Project Cost** | **249000** | **249000** | **100.0** |
| Other Contributions: | | | |
| Clients | | 0 | |
| CMHC | | 21095 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 270095 | |
| Land & Services (Deduct) | | 0 | |
| **Net Construction Cost** | | **270095** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 249000 | 41500 | 920 | 45.11 | 486 |
| Net Constr.Costs | 270095 | 45016 | 920 | 48.93 | 527 |

## 10. Training and Skills

Most of the construction training was provided on-site in groups by the Construction Manager. The lead workers in two households had moderate building skills, and another one was a carpenter. Workers on tne other three households had few construction skills prior to the Demo project. However, according to the Construction Manager, all clients have improved their skills, with the exception of the carpenter client. Most clients credited the Construction Manager for their improvement in skills.

## 11. Construction Quality

None of the houses was substantially completed during the visit by the monitoring consultant. Not all houses had been sided. Some ventilation turbines had yet to be

properly installed on the roof. All caulking, grading and interior finishing works were not done yet.

According to the Regional Office Architect, some of the steel connectors for the foundation post and pad system were installed incorrectly. Primed steel connectors were used below grade whereas galvanized steel connectors were used for above grade portion of the work. This will cause corrosion in the future.

The quality of prefab panels was fine except the appearance and texture of the interior finishing (sturdi-wood). However, this was supplied in accordance with the specifications and CMHC L.O. was aware of the product. If the Demo budget had allowed, CMHC would have installed wall panelling over the sturdi-wood in the living room and kitchen/dining area, while the rest of the wall surfaces would then have been painted.[1]

Common nails were used to fasten sheathing to the wall panels, which required more preparation before paint could be applied. Some wall panels did not fit together very well, so that there were excessive gaps at the seams and warped interior partitions. This affected the smooth opening and closing of prehung doors. Some interior wall panels had yet to be fastened properly. Despite strong protests from the ADD-ON supervisor, some of the prefab panels were not de-iced before erection, and this may bhave been responsible for some of the fitting problems. Some of the window and door frames were not in the same plane as the wall finishing surfaces, making it hard to install trims. There was minor damage to door and window frames in some units.

Most attic insulation was installed and not visible. In one 2-bedroom unit, some wall insulation was packed too tightly. The ceiling insulation were snowed on before closing in the roof. The snow should be removed before the warm weather sets in. Insulation stops had not yet been installed.

The quality of AVB work was quite poor at the time of inspection[2]. The continuity of AVB at floor/wall/ceiling and building envelop openings (ceiling attic hatch, chimney, windows and doors) had not been maintained. The exterior wall and ceiling panels were supplied with AVB. The AVB projected at least 6" outside of each panel in all directions to facilitate jointing with the adjacent panels. The AVB from adjacent panels was folded back and sandwiched between the two panels, without caulking. The AVB from the ceiling panels overlapped with the AVB from the wall panels at the top plates, but was not sealed with caulking. The site installed floor AVB did not join with the wall AVB. A bead of caulking was applied along the joint at subfloor and wall assembly. Not all AVB sheets were folded back properly along ceiling and wall, especially at corners. The sealing of AVB at windows and doors in wall panels was not done

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1 Subsequent Local Office reports indicate that panelling has now been installed.

2 The CMHC Local Office reports that the AVB installation has been upgraded subsequent to the field visit.

in the factory, with the result that there was poor airtightness. The air barrier in one 2-bedroom unit was wind-torn and did not have enough overlaps at the joints.

A considerable amount of house moisture is likely to exfiltrate through the wall assembly due to the poor sealing of the AVB. The T&G rigid insulation may impede the escape of moisture from the house, causing condensation in the fiberglass wall insulation.

Due to high moisture generation in the household, condensation will be a problem unless some form of active ventilation is introduced. Mechanical ventilation is not feasible since there is no power. A natural ventilation system using the wind turbines installed on the roof of the units should be investigated as a means of exhausting warm moist house air.

Overall, given proper supervision, self-build does not adversely affect the quality of the construction. In fact the Demo Project received many more than the standard three CMHC visits that a regular RNH house receives, since the CMHC Inspector visited the project site on weekly basis. The violations to the 1985 National Building Codes (health and safety issues only) are as follows: no plumbing, no electricity, and no provision for mechanical air change requirements. A final inspection will be made by CMHC before clients move into their houses.

## 12. Views on the Project

The Garson Lake experience indicated the technical and budget feasibility of using building "kits" in remote communities. The following specific observations were made:

- No apparent effect on project scheduling can be attributed to using the ADD-ON kits. The deciding factors seem to be availability and motivation of clients and volunteers and the skill level of the work team; this is applicable to all kinds of construction methods.
- Clients with prior building skills and the Construction Manager preferred the conventional stick-built method. Unskilled clients preferred the use of kits, as it is easier and faster. A homeowner from the Descharme Lake Demo Project expressed preference for ADD-ON kit.
- Savings in construction time are not substantiated (the L.O. estimated a saving of 25%). This is due to: 1) only basic shells were prefabricated; on-site installation of cladding, roofing, insulation, AVB, interior finishes and other components was required to complete the house; 2) the poor work output of clients; 3) packaging of ADD-ON "kits".
- Since labour cost is free for Demo projects, prefab "kits" might not be the most cost effective method of building. However, this alternative building technique should benefit regular RNH programs, where paid labour is used.

*CMHC Viewpoint*

Overall, CMHC L.O. was not satisfied with the ADD-ON kits and will most likely use conventional stick-built for 1988 Demo projects, incorporating as much

prefabrication as possible and using local suppliers. The L.O. felt that the design of the Add-On kit was basically fine. However, the packaging of the kit for reassembly on site should be improved. Another criticism was that the roof system of Add-On kit was too complicated and that conventional roof trusses would be more appropriate. There were also some additional specific reasons for CMHC's lack of enthusiasm for the Company:

- The L.O. claimed that erection of the "kit" on site was more difficult than had been implied in the initial presentation by Add-On Buildings Ltd. in Saskatoon.
- House packages were not crated in plywood board as had been indicated by the manufacturer at their original presentation. Only a polyethylene cover was provided, which was not suitable for an airlift operation.
- In some cases, building components of the units were not packed in any logical building sequence, and the quantities of unassembled materials for some units were either too much or too little, resulting in unnecessary earlier opening of house packages, delays and frustration.
- According to the Construction Manager, some materials were short or missing from the "kits" and had to be purchased from local suppliers and delivered to site by CMHC.
- Add-On Buildings Ltd. was not very cooperative after mid-December, 1987. (There was no 10% holdback on contract payments to Add-On. The L.O. is considering the requirements of a Performance Bond in future Demo projects from potential bidders.)

*The ADD-ON Viewpoint*

Add-On Buildings Ltd. presented a different view. In Add-On's view there was a lack of control over the local work crew. Not enough local workers were available for on-site erection, and those that turned out had poor output and lacked discipline;

Add-On also maintains that, since the Garson Lake Project was the company's first commercial contract in Canada, it went beyond its contractual obligation to satisfy CMHC L.O. by providing:

- free design and drawing services for 2-bedroom and 5-bedroom units;
- free product upgrade, e.g., substitute exterior paint with vinyl siding. This added 6,400 lbs. to the "kit" and the original plywood crating had to be changed to woven polyethylene to reduce the weight of the "kit" for helicopter transportation;
- 15 instead of 5 days of on-site supervision. The Add-On superintendent had to do manual work because of the lack of hardworking local workers.

According to Add-On, there was not enough advance notice given regarding the change of transportation mode for the house packages from surface to helicopter airlift. (Add-On was informed of this change on October 8, before the official signing of contract on Oct. 22.). House packages could not be safely unloaded in front of some units due to site obstructions. House packages were not guarded in Garson Lake and

there was no control over access to the packages. As a result, building materials were dispersed throughout the community. Misplacement of materials was inevitable. The Company maintains that plenty of surplus materials were provided with the kit, from 10% extra siding to a double volume of roofing nails. The reported material shortages could only be due to excessive wastage, misplacement or pilferage.

There seemed to be a severe lack of communication between the L.O. and Add-On Buildings Ltd. The President of the company was not aware of any negative comments from CMHC prior to a telephone conversation with the monitoring consultant. The Add-On President felt that his company should not be criticized for problems caused by client workers.

Learning from the Garson Lake experience, Add-On Building Ltd. "would not accept any further contract for the supply of the component packages into similar communities without being also commissioned for the erection of at least rough house structures". Add-On would erect the basic shells (with windows, doors and partitions) in a day even in winter condition using their own work crew for a very small increase in cost (approximately $2000 per unit, or $24/sq.ft.). Then, the balance of building materials for house completion could be stored and locked in the shells. CMHC could inspect the work and take over the responsibility of the remaining portion of the work. This is a very attractive offer, and CMHC should try this approach in future projects.

A major hindrance to slow project progress was winter construction. The erection of Add-On "kits" did not begin till early December, approximately two months after the completion of foundations. The main reason for the delay was that Garson Lake is quite unoccupied for two months in the summer; thus, client selection was put on hold till the fall, and the chance for an early construction start was missed.

The cost of transporting materials for the six houses to Garson Lake was very high, more than the cost of two Add-On house kits. This was due to the use of a helicopter and plane in order to deliver the 1987 Demo program on time. The cheaper option would have been to wait until the winter road was in operation, at the cost of not meeting the March 31 project close-out deadline. Experience indicates that the project deadline for remote and inaccessible communities should be more flexible to allow for a 18-24 month delivery time frame. This would allow building materials to be hauled via winter roads with construction beginning the next spring, when weather conditions were favourable. This extended schedule would also allow ample time for client and Construction Manager selection and pre-construction management.

Again, the success of the Garson Lake Project was hindered by the quantity and quality of clients' input. There were no volunteers, not enough clients willing to work and no cooperation between clients. The lack of cooperation among clients was due to an on-going feud between two client families in the community. Generally, there was little enthusiasm among clients about getting a house, since they believed (incorrectly) that they would not be given the houses. The Construction Manager, a local man, and CMHC field staff failed to motivate most of the homeowners. Part of the problem was due to a gap in cultural values and the difficulty of communicating through

translators, but perhaps if CMHC had more time for community and client investigation, some of these problems could be avoided.

Another potentially explosive situation regarding client selection has yet to unfold. Apparently the CMHC L.O. depended on a council member in Garson Lake to organize the general information meeting and take charge of getting residents to fill in homeowner application forms. According to field sources, the council member at that time thought residents with Indian status were not eligible for Demo houses and did not inform those people about the meeting and did not invite them to fill in application forms. CMHC's understanding of the meeting is that, of the Status Indians present, only one indicated interest in a house. In any case, many Status residents were shut out of the Demo Project even though some of them would have been selected according to CMHC's point-rating system. Some of the residents and the Chief from a nearby band have vowed to pursue this matter further. Perhaps in the future, when a small community is targeted for Demo project, CMHC field staff should try to contact all residents directly.

CMHC spent much time and effort to "babysit" both Descharme Lake and Garson Lake Projects. The L.O. staff, in addition to tending to their regular RNH duties, had to act as Program Officer and Project Manager for the Demo Project. This led to severe demands on their time, which could be alleviated by having a full-time CMHC staff person responsible for all Demo projects in each Province.

## Project Report: BC/Yukon Region

Office: BC/Yukon Regional Office.
Visited by: Wayne Wilkinson

### 1. Program Overview

The BC/Yukon Region received an allocation of $415,000.00 to construct 10 units under the 1987 RNH Demo Program. This allocation was split evenly between the Whitehorse and Prince George offices. The Yukon program was delivered in Old Crow through the Whitehorse district office and received a $12,500 contribution from the Yukon Housing Corporation (YHC) to cover the cost of installing sewer and water holding systems in the houses. The BC project was delivered at Mesilinka River through the Prince George office.

Neither of these projects have stimulated any negative reaction. In fact some of the detractors from last years project in Bridge Lake (100 mile House) have come out in favour of this year's project in Mesilinka River.

### 2. Program Management

In both locations CMHC has was the active partner in delivering the projects. In BC the Ingenika Point Indian Band assisted with local promotion and support of the project and identification of clients.

In the Yukon the RNH TriPartite Management Committee which includes the Council for Yukon Indians, YHC and CMHC, selected the community and approved the list of clients. The Old Crow Band identified and recommended clients and provided local management and logistical support.

Clients in both locations were able to contribute to the design of the units by submitting a floor plan. In the Yukon this was done through face to face consultation with the designing architect.

Financial control was exercised by both offices through verification by on site inspections carrier out by their branch inspectors. These inspections were also used to provide quality control on the projects.

### 3. Program Delivery

Both projects in this region had a high degree of commitment and participation from the local Indian Band. They generally provided local promotion, identification of clients, and some political advocacy for the program. In Old Crow the effort extended to sharing of resources, loaning material and logistical co- ordination.

There were also some variations in delivery between the two projects. In Old Crow clients worked independent of each other. This resulted in a great disparity in stages of completion between houses in this project. In Mesilinka the construction

manager organized work teams and the houses were constructed in stages with progress being equal among the houses.

Old Crow houses were stick built, while Mesilinka houses were prefab wall sections.

The Construction Manager in Old Crow sub contracted all the tendering, logistical and project co-ordination to the designing architect. Leaving himself with responsibility for on site supervision and community co-ordination only. This is consistent with the experience of the individual and the horrors of communication and transport inherent with remote communities.

The Prince George office arranged things slightly differently due to differing circumstances. The supplier was responsible for delivery to the site and design based on floor plans submitted by the clients. This left the construction manager with only site specific problems to deal with. This strategy too was designed to overcome the problems of remote communities.

## 4. Views On The Program

The Construction Manager of the Mesilinka project has suggested that sufficiently detailed information about the required level of commitment and participation was not available to the clients. He recommends that material be developed that will be specific to remote native communities. A similar recommendation was made from the previous project at bridge Lake.

In the view or all parties timing of the delivery of the projects is critical. Clients in both projects protested the timing. In the Yukon it meant winter working conditions. In BC it conflicted with traditional pursuits such as fall hunting and gathering of fuel for winter. Project managers should investigate thoroughly all the implications of timing, such as what are the traditional pursuits of the community and when do they take place; when is employment available and what impact does this have on the clients ability to perform. These questions must be considered with an open mind. What is a sport or recreation to one culture or individual may well be a means of livelihood to another.

The experience, values and preconceptions about how the project should operate and those of the client must be synchronized. A good match will produce a successful project with all parties having an opportunity to find it rewarding. If insufficient attention is paid to the selection of the co-workers more successful projects will result.

Both projects encountered some logistical problems which threatened the projects. These issues need to be addressed in greater detail to ensure that there is no loss or damage of material or impetus during critical periods.

## Project Report: Mesilinka River, B.C.

| | |
|---|---|
| Local Office: | Prince George Local Office. |
| CMHC Project Officer: | Terry Stevens & Richard Anda |
| Construction Manager: | |
| Date visited: | 16 February, 1988 |
| Visited by: | Wayne Wilkinson |

### 1. Project Overview

The Tsa Ta Nay Indian band live in the Mountainous area of North Central British Colombia and make their living mostly by trapping, hunting and fishing along the Mesilinka River. Other seasonal work is also sometimes available from fire-fighting and logging. Transportation to this isolated community is difficult. Materials can only be shipped by truck over 200 miles of unmarked narrow logging roads. There are no direct means of communication with the community. Messages must be relayed through logging camps in the area.

Five pre-fabricated dwelling units are being built under the 1987 RNH Demonstration Program. These will replace the existing tent frames and log buildings constructed for seasonal use.

### 2. Project Organization

CMHC is the active delivery agent in this project. CMHC's role included advocacy for the program, selection of community and clients, tendering for material supply and services including the Construction Manager and sub-trades, co-ordinating other Government agencies, and quality and financial control. Both program and inspections personnel visited the community to facilitate the project.

The construction manager lived temporarily in the community during the duration of his contract. He was responsible for all aspects of the on-site work and keeping a daily journal on the project from which he made monthly reports to Prince George. Apart from the usual requirements for work experience the construction manager was required to have demonstrated an ability to work with native people in remote areas and be self sufficient since no commercial facilities were available. The final selection was ratified by the clients.

Prefabricated housing packages were chosen because of the early onset of winter in this area and the low skill level of the clients. The successful tenderer was also responsibility for delivery of materials to the site.

Work requiring critical skills or equipment was sub-contracted out. This included excavation, electrical wiring, gas fitting and drywall taping.

### 3. Clients

The prime motivation for selection of the community for this year's project was to avoid any adverse public or political reaction. It was originally the intent to deliver this years project at Ingenika Point and steps were well under way when the Band decided not to participate and opted instead for the Emergency Repair (ERP) Program. Through discussions with Ingenika it was decided that the splinter group at Mesilinka River could benefit from the RNH Demo Program. The selection evoked support from politicians and Government members who had been critical of last years project at Bridge Lake (100 Mile House).

Client selection was done on the basis that they had to be families, indigenous to the area and in need of core housing. The Band provided CMHC with a list of proposed clients, verification of income, client profiles and description of housing.

### 4. Site And Servicing Issues

The area the project is located in is Crown Land and those people living in the area were illegally occupying the land. This problem was solved by the Province issuing a License to Occupy to each of the clients. This had never been done before and was accomplished in the amazingly short time of 1 month, which is an indication of the degree of political support the project has.

Road access to each of the lots was provided by a logger working in the area who developed access roads into each of the houses.

The soft sandy well drained soil provided excellent conditions for installation of the septic systems and foundations. None of the houses have wells but the close proximity of water close to the surface indicates that wells could easily be dug or drilled close enough to the house for connection to a pressure system.

### 5. House Designs

Floor plans for each of the houses were prepared and submitted by the clients. These were issued as part of the tender documents for the materials package.

The houses are small and compact, built on a crawl space with no garage. Sizes vary from two to four bedrooms depending on family size. The floor plans centre on an area containing a wood fired stove or stoves used for space heating and cooking. Eating, living, and sleeping rooms are laid out around this family hearth.

Plumbing systems have been installed though there is no pressure system to supply water. Pressure systems and wells can be added by the clients as desired. The houses are completely wired also although there is no electricity available in the foreseeable future unless the householders provide a generator.

Propane hot water heaters were supplied with the package, but have not been hooked up yet. The clients are expecting this to be done as part of the project and to get propane lights installed at the same time

Mesilinka River unit under construction

Completed unit in Mesilinka River

All the clients interviewed expressed concern about the snow build-up on their roofs. It appears that they are unaccustomed to roof trusses and unaware that their trusses were designed to withstand the snow loads of the area.

## 6. Tenders And Materials Packages

The Branch initially began inviting tenders for the supply of prefabricated house and materials packages, but became concerned about possible controversy this method might provoke and decided to reject all bids received and go to public tender. Tenders were to be submitted based on an NHA Outline specification and the floor plans submitted by the clients. With such broadly defined specifications for the work bids were expectedly varied. Each bid was then adjusted and compared to develop a comparative model. Bids lacking certain components were adjusted upward by the cost of the missing component. The lowest bid was then presented to the clients for their consideration.

Contracts for the construction manager and sub-trades were also advertised publicly. Applications for the construction manager were short listed, applicants were interviewed and the successful applicant was given a final interview by the clients.

## 7. The Construction Process

Those components of the project which by their nature or regulations required specialized skills or equipment were contracted out. These include excavation for the septic system and foundation, electrical wiring, drywall taping, gas fitting and finished flooring installation.

The clients involvement in the construction began with selection of their own lots, laying out of the access roads, house location and septic systems. Most of the carpentry work was done by the clients and their immediate families. The construction manager organized the client builders into work parties that co- operatively constructed all the houses. Construction proceeded for the most part evenly on all the units. This procedure was generally followed even when some of the clients were absent from the work site for extended periods.

Once the units were closed to the weather, with roof on and windows and doors installed, the work teams broke up and clients worked mainly within their own family group on their own house.

Six skilled men from other bands contributed to work on the houses. Four from Ingenika Point put siding on one house and two from Tacla hung gyproc in all the houses. The status of these volunteers in unclear. It seems most likely that their Bands sent them in to help with the construction.

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 0 | 0 | 0 |
| Sewage | 0 | 100 | 0 | 0 |
| Electrical hookup | 0 | 0 | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 25 | 0 | 50 | 25 |
| Framing & sheathing | 20 | 0 | 60 | 20 |
| Insulation & AVB | 20 | 0 | 60 | 20 |
| Drywall/panelling | 20 | 0 | 20 | 60 |
| Drywall finish | 0 | 100 | 0 | 0 |
| Roofing | 20 | 0 | 60 | 20 |
| Siding | 30 | 0 | 35 | 35 |
| Door/window inst. | 30 | 0 | 35 | 35 |
| Int. Fin, exl.drywall | 0 | 0 | 100 | 0 |
| Cabinetwork | 50 | 0 | 50 | 0 |
| Heating & Ventilation | 70 | 0 | 30 | 0 |
| Plumbing & Fixtures | 100 | 0 | 0 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| **Overall** | **30** | **20** | **30** | **20** |

## 8. Information, Training And Skills

No formalized training sessions were organized before or during the project. When a new component of the work was to be tackled the Construction Manager would gather the crew together and explain and demonstrate as necessary what and how it was to be done. As the work was under way individual tutoring would augment the group exercise. The clients all praised the Construction Manager for his patience and acknowledged his teaching as being a significant contributor to their learning. They also felt they had learned a lot from the hands-on experience.

## 9. Construction Quality

From inspection reports and interviews with the Chief Branch Inspector and the Construction Manager there were no recognized deviations from applicable building codes or Builders Bulletins.

The quality of framing and finishing was for the most part quite good. There were a few nail pops evident in the gyproc of some houses but this was mostly minor in nature.

Materials supplied were of good quality and were equal to the intended task, except for the precast cement bases for the wood stoves which had its edges crumbling and breaking off.

Some clients expressed concern about the fact that no underlay had been provided for placement over the subfloor before the linoleum was installed. The supplier maintains that he installed select sheathing which does not require an underlay. Some minor ridging was noted at joints in the plywood.

In all the houses visited it was noted that the humidity was in the 40 to 50% range. This was a subjective estimate by the interviewer. Four of the five householders complained that their roofs leaked and dripped from the ceiling fixtures. By visual inspection it was noted that none of the Air-vapour barrier installation was sealed. From clients interviews it was determined that the A-V barrier had not been installed continuously behind partition framing members and no sealing was done at joints or penetrations.

Visual inspection revealed that a ground sheet was not installed on the crawl space floor or over the insulation on the PWF foundation walls. Sand had been piled against the Fiberglas batt insulation on the inside of the foundation walls and the insulation was wet and filled with ice.

## 10. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 500 | 0 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 500 | 0 | 0 |
| construction manager | 17500 | 17147 | 0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 1000 | 631 | 0 |
| materials package | 160710 | 171178 | 0 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 11000 | 1108 | 0 |
| labour contracts | 6000 | 15090 | 0 |
| miscellaneous | 10290 | 402 | 0 |
| Total Project Cost | 207500 | 205556 | 100 |
| Other Contributions: | | | |
| Clients | | 2500 | |
| CMHC | | 33000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 241056 | |
| Land & Services (Deduct) | | -3200 | |
| Est.Net Construction Cost | | 237856 | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| **Project Budget** | 205556 | 41111 | 943 | 43.60 | 469 |
| **Net Constr.Costs** | 237856 | 47571 | 943 | 50.45 | 543 |

The houses are near to completion with only minor inside trim to be done on all houses and exterior siding on four units. As these materials are on site project costs are therefore establishable at $205,556, $1944 under the commitment figure of $207,500. This does not include propane lights, which the clients will have to provide themselves.

Two of the houses were two bedroom units at 768 sq. ft. One was 988 sq. ft and the two larger homes were 1070 and 1120 sq. ft. This gives an average per square foot

cost for all houses of $43.59. This does not include the value of work done which was not establishable at the time of the community visit, namely; drywall taping, lino installation and the work done by the men from Acla and Ingenika Point.

No comparative homeownership program costs were available as all other units are in more accessible locations.

With the exception of one client individual contributions were less than $100.00. Land costs were negligible. A permit was granted for $1.00 and survey costs were born by the Province.

**11. Views On The Project**

The clients unanimously applauded the program. They were confident in their ability to provide log houses without the program, but acknowledged that it would not have been of the quality of the one they did build. They all agreed there was little or no problem with site selection, materials delivery, or CMHC. They did however emphasis the difficulty that they had with building in the fall. They suggested that future projects be scheduled with consultation with the clients to avoid seasons of traditional economic pursuits. For them spring and summer are slack months food is plentiful and fuel wood gathering of minor importance.

The clients stated that they found building the houses to be a satisfying and rewarding experience. Some felt it might lead to employment. The Construction Manager said that four of the five clients had improved their skill level and that three could be employable and one was near the professional level. He also felt that the use of prefabricated wall systems were advisable for this type of project. It reduced the skill requirement for the clients and made his job easier because he did not have to teach structural wall framing principals.

The Construction Manager felt that the clients did not have a true grasp of the commitments required of them in the execution of the project. This lead to some misunderstanding in the beginning. He would like to see the development of a information package that would clearly portray these requirements

## Project Report: Old Crow, Yukon

| | |
|---|---|
| Local Office: | Witehorse Local Office. |
| CMHC Project Officer: | Bill Hall/James Lamoureux |
| Construction Manager: | Howard Linklater |
| Date visited: | 20 January, 1988 |
| Visited by: | Wayne Wilkinson |

### 1. Project Overview

Old Crow is a remote community located 60 miles north of the Arctic Circle on the Yukon's North Coastal plain. It is accessible year round only by air, which adds appreciably to the cost of outside goods and services. The population of 250 inhabitants is mostly of Loucheau Indian ancestry, a small portion of whom are non-status Indians and Metis. The economy of the community is largely based on subsistence pursuits, trapping and native craft work. Of lesser importance are jobs in Government and service industries.

Five detached dwelling units are being built under the 1987 RNH Demonstration Program. They are constructed on ice rich permafrost soils using a gravel pad and suspended floor system. Construction is of wood framing with simulated log siding.

The community was selected by the RNH Tripartite Management Committee as a result of the recent Yukon Housing Needs Study. This selection is largely supported by Community and Territorial Government leaders.

### 2. Project Organization

Unlike last year's project which involved the Yukon Housing Corporation as the active delivery partner, this year CMHC is delivering the project. Program staff administer and document the project, maintain financial control, and make payment on project expenses. They also coordinate the interested and involved parties such as the clients, the Tri-partite Management Committee, Contractors, Politicians and the Band. Quality control is exercised by the Local Office Inspector.

Responsibility for the physical delivery of work in the community has been contracted to the Construction Manager. Much of this has been delivered by a sub-contract with the design Architect of the houses, which is co-ordinating tendering and purchase of services and supplies, including transportation to the community. CMHC agrees that he has been extremely helpful in the project and has cut their time involvement by 50%

### 3. Clients

Community selection was done by the Management Tripartite Committee based on the findings of the Yukon Housing Corporation "Housing Needs Study" and the Operational Guidelines. Targeting Old Crow has avoided any negative reaction in the

Yukon. Generally people are not very aware of what goes on there and are not upset by programs aimed at areas with so many obvious disadvantages.

Within the community there is little political opposition to the program. Some Band members have voiced concern based on the misconception that this is Band housing and that non-status, Metis and Whites are getting their houses. The Chief and Council actively support the project and have committed resources to it. They see the project as an opportunity to relieve the disparity between those who can obtain housing through programs that prevail in the community, such as Indian Affairs programs, and those who cannot.

Councillors expressed an interest in becoming the active delivery agent for the program next year. They feel they are putting so much time into it that they might as well take it over. They believe this would improve efficiency of delivery and help to ensure successful completion of the houses. They have apparently been convinced by CMHC that this program can not be delivered on "Land Set Aside".

Client identification was done through a co-ordinated effort of the Band, the Construction Manager and the Architect, all of whom have an intimate knowledge of the community and inhabitants. Criteria included most in need, worst house, lowest income and, most importantly, those most able to successfully build a house within the terms of the Guidelines. Final selection was made by CMHC, Whitehorse.

**4. Site And Servicing Issues**

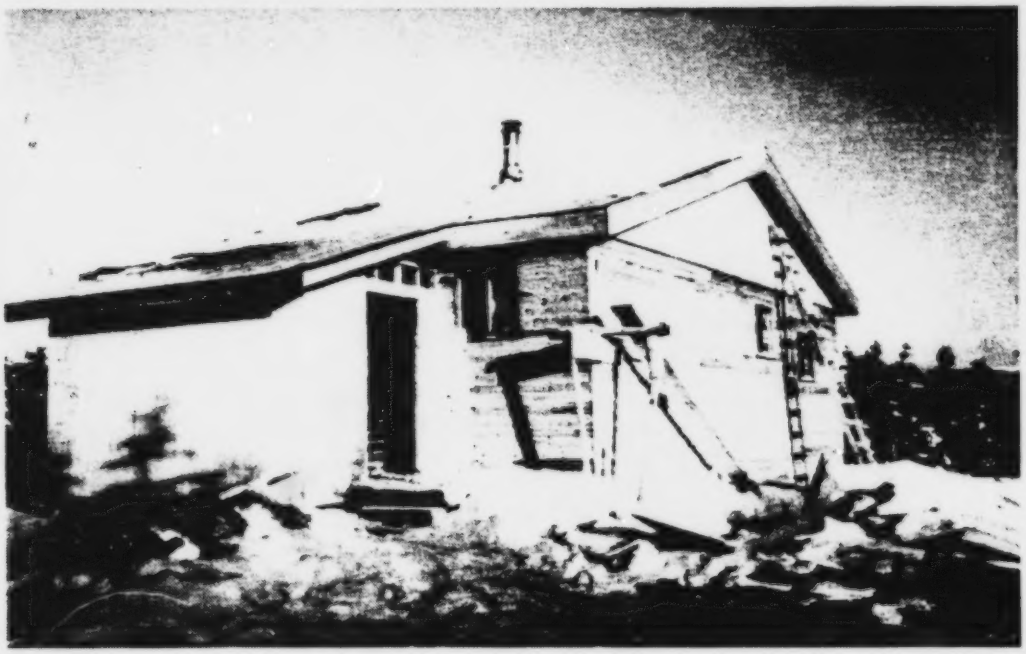
There are four issues which have a particular impact any building construction project in Old Crow.

The most easily recognized are those dealing with climate. For much of the year it is very cold (-35 is considered warm in the winter and much normal outside activity is resumed). Long periods in the low -40's are common. At these temperatures outside work is generally unproductive and of a lower quality than work done in warmer months.

Logistics pose their own problems. All materials must be air freighted into the community. This can only be done when the strip is frozen hard or has dried after the spring thaw. The cost for air freight to Old Crow is $1.38/lb. To lower costs aircraft space is often shared with others thus loads become mixed and deliveries confused. The number of times the materials is handled often 5 or 6 times before it gets to the site adds cost and increases the risk of damage and loss and there is little opportunity for replacement of any of the materials with local materials.

Least recognized by people outside of Old Crow is the lack of available serviced land, ie. road and power for building lots. Most of the land suitable for building is within the "Lands Set Aside" and expansion of the community is restricted by the airport which forms the boundary completely across the northern side. A new subdivision has been established northeast of the community. It is located about 2 kilometers form the store and community centre and 3 km from the school and the nursing station. People are

understandably reluctant to live this far away when no one owns cars and skidoo gas cost $1.00 per litre.



Old Crow Demo unit under construction

## 5. House Designs

House design has evolved to deal with the restrictions of transportation, a cold climate and permafrost soils. This year's designs by Northern Cadworks of Whitehorse have been carefully scrutinized to reduce the cost of shipping. Framing materials are minimized, while high levels of insulation are maintained with R-48 floors, R-28 walls and R-40 ceilings.

The houses are typically small and compact. Clients were presented with the same shell and package of amenities that could be delivered within the budget. Room layout and location of windows, doors, etc., was up to the clients. Natural wood finishes ndpaneling throughout are considered appropriate in Old Crow as these materials can usually withstand foundation shifting better than gyproc.

Ceilings are vaulted and the partitions do not extend to the ceiling. This has evolved as standard construction in this community for two reasons. First the short

walls allow heat from the central wood stove to circulate more freely[1]. For economy of material the ceiling finish is fastened directly to the bottom of the trusses rather than installing ceiling joists.

The plumbing system includes a 250 gal water tank and a 350 gal sewage holding tank. The bathroom has been designed to include these tanks within the thermal envelope so that they can be kept from freezing and can operate at low water volumes. The entire system can easily be drained to prevent freezing when the house is vacated for extended periods.

The foundation systems starts with a 760mm gravel pad compacted over the native soil and ground cover. The purpose of the gravel pad is to give a thaw stable material for the annual thaw/freeze cycle. 760mm square preserved wood foundation pads transfer the weight of the house to the gravel. To allow periodic adjustment of the foundation system, wooden wedges are placed between the foundation pads and load bearing beams.

## 6. Tenders And Materials Packages

The architect, being based in Whitehorse, invited tenders from for the supply of materials based on material lists. Three firms were approached in each trade area. Awards were based on the lowest tender received. FOB points were given as the staging area for the selected air carriers.

The bulk of foundation and framing materials were trucked to Inuvik then shipped by Hercules aircraft to Old Crow. This charter is negotiated each year by the Yukon Government for the general resupply of the community. Demo material was sent with everyone else's, and no individualized crating of house packages was done. Some paint coding of materials was done to identify the project, but people at the destination were somewhat confused as to the meaning of the coding. Some mixing and missed delivery of material ensued. This was reported consistently throughout the client interviews as being a major (!) problem. Some still doubt they have all their material.

Subsequent material shipments were trucked to Eagle Plains and transshipped by small charter aircraft to Old Crow. This necessitated the breaking of bundles for loading of materials piece by piece which created even higher risks of loss.

Once in Old Crow, materials were loaded and transported to the site or storage area. Thus they might be moved once and some times twice within the community before finally getting to the site.

---

1 Subsequent to the field trip, CMHC staff attended a Band Council meeting at which the open walls were said to be a problem because of noise transmission and children playing on top of the partitions. The concensus of the meeting was that solid partitions are preferable for future projects.

## 7. The Construction Process

The following table provides an approximate breakdown of the relative on-site labour inputs of the various types of participants:

**Table 1 Approximate Percent Construction Labour By Type**

| Type of Work | CM | Subtrade | Clients | Volunteers |
|---|---|---|---|---|
| Excavation | 0 | 100 | 0 | 0 |
| Water supply | 0 | 75 | 25 | 0 |
| Sewage | 0 | 75 | 25 | 0 |
| Electrical hookup | 0 | 100 | 0 | 0 |
| Grading | 0 | 100 | 0 | 0 |
| Footings/found.walls | 10 | 0 | 75 | 15 |
| Framing & sheathing | 10 | 0 | 75 | 15 |
| Insulation & AVB | 10 | 0 | 75 | 15 |
| Drywall/panelling | 10 | 0 | 85 | 5 |
| Drywall finish | 10 | 0 | 85 | 5 |
| Roofing | 10 | 0 | 85 | 5 |
| Siding | 10 | 0 | 85 | 5 |
| Door/window inst. | 10 | 0 | 85 | 5 |
| Int. Fin, exl.drywall | 5 | 0 | 95 | 0 |
| Cabinetwork | 5 | 0 | 95 | 0 |
| Heating & Ventilation | 0 | 75 | 25 | 0 |
| Plumbing & Fixtures | 0 | 75 | 25 | 0 |
| Interior electrical | 0 | 100 | 0 | 0 |
| **Overall** | **5** | **30** | **60** | **5** |

Parts of the construction process requiring specialized skills or equipment to complete have been contracted out. These include construction of the gravel pad, site grading, electrical wiring, plumbing and installation of the HRV.

All clients reported that they worked independently of the other clients. There appears to have been no organizing of work teams or sharing/exchanging of hours. Volunteers were very involved on some houses and totally absent on others. For example, Effie Linklater's sons are building her house but Harold Frost only had help to put up his roof. Harold is now working for wages on Roger Parent's house.

Stages of completion vary widely across the project. Harold Frost has complete all work except the plumbing and has been waiting for the plumber to complete the plumbing for four months. Roger Parent did not start work on his house until Feb 12th. He was not originally in the program and was only selected as a client September 28 after the original client, Moses Lord, withdrew. The other three vary in between, but all have siding, doors and windows in and most of the roof on.

## 8. Information, Training And Skills

No formalized training was done before or during the project and though *House As A System,* CMHC Builders Courses and an R-2000 course were scheduled in the community during the project none of the clients participated. The clients reported learning mostly from doing and only mildly attributed any learning to the Construction Manager. One cannot dismiss this altogether though without taking into consideration

the politics of small rural low income communities. It is difficult to assess the impact local politics, personal stature and human dynamics play in a closed community.

## 9. Construction Quality And Code Compliance

Workmanship and materials are of a uniformly good quality. Finishing work in Harold Frost's house is impressive. Care has been taken in the two units where the poly air-vapour barrier has been installed (obviously some training has taken place). Joints are mostly made on solid backing, and sealed with acoustical sealant and window and doors installations are sealed.

The quality of workmanship has been ensured by regular visits by the CMHC Inspector. Specific skilled work such as plumbing, ventilation and electrical wiring will be done by professional sub-trades.

Conformation to code requirements for ventilation will be provided by a Heat Recovery Ventilator, thereby ensuring air quality and humidity control in these air tight houses.

## 10. Project Costs

The following table provides a breakdown of costs at the initial and final stages of the project.

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 0 | 0 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 750 | 0.3 |
| construction manager | 0 | 19000 | 6.9 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 0 | 144250 | 52.5 |
| extra freight costs | 0 | 62100 | 22.6 |
| equipment rentals | 0 | 750 | 0.3 |
| labour contracts | 0 | 35000 | 12.7 |
| miscellaneous | 0 | 13150 | 4.8 |
| **Total Project Cost** | **0** | **275000** | **100.0** |
| Other Contributions: | | | |
| Clients | | 5600 | |
| CMHC | | 24500 | |
| Other | | 69000 | |
| Est.Actual Total Cost | | 374100 | |
| Land & Services (Deduct) | | 69500 | |
| **Est.Net Construction Cost** | | **304600** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 275000 | 55000 | 787 | 69.89 | 752 |
| Net Constr.Costs | 304600 | 60920 | 787 | 77.41 | 833 |

With only one of the houses in this project near to completion, unit costs are not finalized. All houses in the project were budgeted at the same cost $55,000. This includes a $2,150 contribution from Yukon Housing Corporation to subsidize the extra costs of the sewer and water storage tanks.

Four of the houses are 816 sq. ft. thus giving a price of $67.40 per square foot. The other house is 672 ft. sq. with a per square foot price of $81.85. There are no current or comparable Home ownership programs in the community.

Client contributions were negligible. Only two will have land costs which they seemed unaware of at the time of interview. These cost are made up of $1000 for land purchase and $1500 for survey costs. The also had to move the church that was previously located on the site to a new location.

**11. Views On The Project**

To summarize, some of the comments made by clients in expressing their views about the project may be slightly prejudiced. A great deal of pressure had recently been put upon them to step up production in anticipation of a heavy visit from CMHC on Feb. 15th. In an attempt to reduce the impact of the impending visit on the interviews I deliberately visited the clients before the interview in a non-official role (I know all but one) to reassure them of my intentions. Nevertheless, with those whom I don't know well, I detected an eagerness to please which may be rooted in their anxiety.

Clients expressed gratitude for the program and had pessimistic outlooks about their ability to otherwise improve their housing conditions. There were two difficulties with the program registered by the Clients; the amount of paper work and the length of time it took to approve the client selection. These factors, they felt, were major contributing factors in their inability to complete the houses during warmer weather. Homeowners were not selected until September 10th only one client felt secure enough to start work before this date.

Clients were pleased with their designs and voiced no interest in changing it, however, they have not moved in yet and most are largely incomplete inside. Some did not feel they had any part in the design but this was not a complaint.

The clients did not say much about the Construction Manager. There were some vague references to his lack of input other than building his mothers house. Many of the off-site duties were subcontracted to the Architect. Skills enhancement was therefore attributed to the experience of constructing the house and not to any training received or working with the Construction Manager.

With the exception of Effie Linklater, whose sons are building her house, all clients agreed they had little or no help from volunteers or each other. This was not entirely true in some cases but experiences were varied. Effie Linklater's house was entirely built by volunteers but she would not consider her sons to be volunteers. Mike Frost's brother is helping him but the brother says Mike is not doing his share. Harold Frost and his wife worked mostly alone while Roger has so far had to hire all his help.

The late start and difficulty of building in winter conditions were consistently cited as major problems. It was felt that this not only slowed work considerably but caused a reduction in the quality of work that was being done. It was suggested that all the paper work should be processed the year before a project begins so that materials can be shipped in the spring and so that construction can begin as soon as the gravel pad is constructed.

One client stated that he did not look for work because he knew he had to build his house. In the summer he could work and build if necessary because of the 24 hour daylight.

The clients also unanimously cited material supply problems. Materials were mistakenly delivered to the store yard of YTG, to the wrong building site, and to the Band's yard/warehouse. There does not appear to have been any local checking of what arrived in the community. In fact the one client who was asked to do this work said he was incapable of it, did not do it, and neither did anyone else. None of the clients had a clear perspective what materials they should have for their house.

## Project Report: Fishing Lake, Alberta

**Alberta Rural Home Assistance Program**

| | |
|---|---|
| Housing Officer: | Leonard Sinclair |
| Construction Manager: | Ken Matthews |
| Construction Advisor: | Jerry McIntosh |
| Date visited: | February, 1988 |
| Visited by: | Michael Pine |

### 1. Project Overview

Apart from a good number of rather dilapidated houses, the main problem in Fishing Lake is overcrowding. Workers laid off from the Fort McMurray operation have returned home, and there are many families doubling up with parents in the area. Fishing Lake is a recognised Metis Settlement, and the land is communally administered.

Key dates include the following:

| | |
|---|---|
| Community info. sessions | RHAP routine surveys |
| Project committed | Jan 1988 |
| Materials contract awarded | Nov 1987 |
| Work begins on site | Nov 1987 |
| First family moves in | Mar 1988 (estimated) |
| Last family moves in | Mar 1988 (estimated) |
| Work ended on site | Water/sewer hookups in spring |
| Project closed out | After water/sewer hookups |

### 2. Community Selection

Fishing Lake is a Metis Settlement of about 500 persons, located 350 kilometres northeast of Edmonton. Selection of the settlement was made through the adoption of the Alberta program, which has its own standing list of priority communities.

### 3. Clients

Client selection is based on family need and housing condition, but elderly and infirm people can be accommodated since there is only a minimal requirement for sweat-equity in the RHAP program. Applicants for the Demonstration Program houses were selected from the lists maintained for RHAP since there is no differentiation between the houses being built under the two programs, except for the funding source.

Applicants complete an application form which is received by the Fishing Lake Waskayigun Association (the Settlement governing body), which assesses the applications and develops a priority list. People are expected to appear before Council to present their own cases. Both the couples selected at Fishing Lake are elderly and are

Two of the small and economical house types that have been developed under RHAP and built throughout northern Alberta

physically unwell and both provided doctor's certificates detailing why a warm house with indoor plumbing would be of medical benefit.

| Name | Adults | Children | Former Accommodation |
|---|---|---|---|
| A | 2 | 0 | Decayed house |
| B | 2 | 0 | Decayed house. |

The income range of participants was $2,700 and $3,000 (social allowance).

**4. Project Organization**

The Construction Manager was an employee of the Settlement Council who regularly oversees the delivery of the RHAP units, and the houses being built for the CMHC Demonstration Program were delivered in the same way. Since most of the work was done by contractors, the amount of site work and instruction required was minimal and did not differ from ongoing RHAP.

**5. Site and Servicing Issues**

The water from wells in this part of Alberta is often not potable; houses are supplied with cisterns buried outside, and these are filled by truck in order to provide all domestic water.

As mentioned above, the land within the Metis settlement area is communally administered. A family wishing to build a house must first obtain the permission of the council to develop a lot, and this approval must be sanctioned by the Alberta government. House insurance has recently become available, since there is now piped water available around the settlement.

**6. House Designs**

The house designs used at Fishing lake are standard RHAP two- bedroom designs with minor non-structural modifications to suit the family. The structure itself is the prefabricated 'Nascor' system -- a wall system consisting of paired stud columns turned parallel to the wall with a layer of polystyrene sandwiched between them, and solid polystyrene infill panels.

The houses are quite modest and somewhat smaller than most CMHC Demonstration Houses with, for example, space being saved by having the bedrooms open directly into the living room, a useful device that reduces the need for corridor access and is allowed by part 9 of the National Building Code.

The construction of the building starts with a 20"x8" concrete footing and a two-foot-high foundation wall of pressure treated wood. On this rest the prefabricated joists which span the house from wall to wall. The walls are prefabricated and insulated with polystyrene foam. The exterior is finished with composition siding. One house has a forced warm air furnace, and one will be heated by a woodburning space heater. Domestic hot water is heated by propane. Cooking is by electricity.

### 7. Tendering And Materials Package

The contracting was done by a construction supervisor reporting to the Council. The prefabricated panels were brought in from Nascor (Elk Point Trusses), and other materials were supplied from Elk Point.

In reviewing the price of these units (see item #9 below), it should be remembered that some items provided in CMHC Demo projects are not included in the RHAP program. The kitchen cabinets (except for a four-foot section that contains the sink), and closet doors are not provided; the family must provide these things themselves if they want them. While these units are smaller than the bulk of those now being delivered under the CMHC Demonstration Program (see table 12), they are superior to most of those in the community, and they provide safe and sound housing.

### 8. The Construction Process

The clients were expected to do a limited amount of work on their own houses (sixteen days), and in most cases this requirement was satisfied by the clients clearing the site and removing the builders' rubbish. All were expected to provide their own lots. (In the case of Kikino, Fishing Lake and other lands dedicated to the Metis, land was obtained from the Settlement Council). There was no problem with the suppliers or sub-contractors who delivered materials or services on demand.

### 9. Training and Skills

Training was not provided for the families who, as they were medically handicapped, were not required to participate.

### 10. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 0 | 0 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 0 | 0 | 0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 30000 | 30000 | 39.6 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 0 | 0 | 0 |
| labour contracts | 43800 | 43800 | 57.8 |
| miscellaneous | 2000 | 2000 | 2.6 |
| **Total Project Cost** | **75800** | **75800** | **100.0** |
| Other Contributions: | | | |
| Clients | | 0 | |
| Alberta | | 6000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 81800 | |
| Land & Services (Deduct) | | -8000 | |
| **Est.Net Construction Cost** | | **73800** | |

### Cost Breakdowns

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 75800 | 37900 | 828 | 45.77 | 493 |
| Net Constr.Costs | 73800 | 36900 | 828 | 44.57 | 480 |

## 11. Construction Quality

Most of the units were incomplete at the time of the project visit; however, the workmanship appeared to be up to normal builders' standards. The Alberta Building Code applies to the project. The houses are inspected at regular intervals by RHAP construction advisors. They carry out initial site inspection, and later return to examine the sub-floor installation, exterior finish, vapour barrier installation. There is one final inspection upon completion.

## Project Report: Kikino, Alberta.

**Alberta Rural Home Assistance Program**

| | |
|---|---|
| Housing Officer: | Leonard Sinclair |
| Construction Manager: | Ken Matthews |
| Construction Advisor: | Jerry McIntosh |
| Date visited: | February, 1988 |
| Visisted by: | Michael Pine |

### 1. Project Overview

Apart from a good number of rather dilapidated houses, the main problem in Kikino is overcrowding. Workers laid off from the Fort McMurray operation have returned home, and there are many families doubling up with parents in this area.

Two clients had paid for additional work to be done including the installation of full kitchen cabinets, a patio door, a porch and minor improvements. Three were too ill or poor to complete the kitchen cabinets but the occupants say that these will be completed as money, time or help become available.

Key dates include the following:

| | |
|---|---|
| Community info. sessions | RHAP routine surveys |
| Project committed | Sept 1987 |
| Materials contract awarded | Sept 1987 |
| Work begins on site | Sept 1987 |
| First family moves in | Nov 1987 |
| Last family moves in | Dec 1987 |
| Work ended on site | Dec 1987 |
| Project closed out | Jan 1988 |

### 2. Community Selection

Kikino is a Metis settlement of about 900 persons, located 40 kilometres south of Lac La Biche, Alberta. It as accessible by a paved, all-weather highway (#36). The settlement sits on a large land grant that is communally administered and the community takes part in a wide range of activities, including farming and game ranching. The community owns heavy equipment which is used in the Settlement, and also permits the community to obtain outside contracts for major forest clearance projects.

RHAP only operates in areas where conventional funding is not available, and the community must have, or institute, a local Housing Association.

### 3. Clients

Client selection is based on a point system involving family need and housing condition but is able to accommodate elderly and infirm people, since there is a minimal requirement for sweat-equity in the Alberta program. Applicants for the Demonstration Program houses were selected from lists maintained for the Alberta program since there was no differentiation between the houses being built under the two programs

except for the funding source. Clients complete an application form which is received by the Kikino Waskayigun Association (the settlement governing body) which assesses the applications and develops a priority list. People are expected to appear before Council to present their own cases. There remains a waiting list of fifty-two families, and houses are being supplied at a rate of six a year.

Two clients were selected initially, both living close to the heart of the settlement; a third client was subsequently identified whose land is some way away from the central area.

| Name | Adult | Child | Former Accommodation |
|---|---|---|---|
| A | 2 | 0 | Decayed house |
| B | 2 | 4 | Overcrowded, decayed |
| C | 2 | 5 | Decayed 2BR |

The income range of participants was from $16,000 to $8,000 with an average income of $12,000.

**4. Project Organization**

The Construction Manager was an employee of the Settlement Council who regularly oversees the delivery of the RHAP units, and the houses being built for the CMHC Demonstration program were delivered in the same way. Since most of the work was done by contractors, the amount of site work and instruction required was minimal.

**5. Site and Servicing Issues**

The water from wells in this part of Alberta is often not potable; houses near the community have a piped water supply from the new water treatment plant; those houses further away have water delivered by community truck to cisterns buried outside the houses.

Since outdoor privies are not uncommon in the area, those householders who do not have access to the community sewer line, and cannot afford to have septic systems installed at the time of construction, are quite prepared to use a conventional outhouse until money or time becomes available to do indoor installation.

Because the land within the Metis Settlement area is communally administered, a family wishing to build a house must first obtain the permission of the council to obtain a lot from the common land, and this in turn has to be approved by the Alberta government.

It is interesting to note that house insurance is now available since there is now piped water available around the hamlet, as well as a fire truck.

**6. House Designs**

The house designs used at Kikino are modified RHAP units, either two- or three-bedroom units with minor non-structural modifications to suit the family. They are

modest and somewhat smaller than most CMHC Demonstration Houses (see table #12), space being saved by having bedrooms open directly into the living room, and in one case the third bedroom opening from the second bedroom. There is typically a combined living-dining-kitchen, although one house placed the bathroom between the dining-kitchen and the living room.

The construction of the building starts with a 20"x8" concrete footing and a two-foot-high foundation wall of pressure treated wood. On this rest trussed joists which span the house from wall to wall, eliminating the possibility of damage to the floor due to differential settlement changing the loading on central supports.

In cases where there is no spine wall on top of the floor, the floor is a little springy. The joists are CMHC-approved for the span involved, which suggests that the standard needs attention.

The walls are 2"x6" studs with aspenite sheathing on which is laid tar paper, stucco wire and finally an application of Akrilon, a synthetic stucco finish that the manufacturer claims to be non-toxic, fire-resistant, weatherproof, scrubbable, colour-fast, asbestos free and not subject to peeling or cracking. It looks good too. The roof is on high-heel trusses, so that R40 can be maintained over the top of the walls. The warm air furnace is usually fuelled, and domestic hot water is heated, by propane. Cooking is by electricity.

### 7. Tendering and Materials Package

The contracting was done by a local Kikino individual using local labour, and the materials were shipped in from Lac La Biche.

In reviewing the price of these units, it should be remembered that the kitchen cabinets (except for a four-foot section that contains the sink), closet doors and the septic disposal system are not provided; the family must provide these things themselves if they want them. In several cases, this had been done, as had other work such as the addition of a porch, with the family paying six or seven thousand dollars of their own money. One family had none of these things done and was quite philosophical about the whole thing: "It would get done when there was enough money." Additional money is available through a program administered by the Metis Settlement Branch and the RHAP to assist in the provision of additional facilities, although the interview did not uncover examples of this funding being used.

While these units are a little more austere than most of those now being delivered under the Demonstration guidelines, they are superior to those in most of the community and provide safe and sound accommodation. One comes away wondering whether the larger and fully finished units of the Demonstration Program are not, in fact, too generous.

### 8. The Construction Process

The clients were expected to do a limited amount of work on their own houses (sixteen days), and in most cases this was satisfied by the clients clearing the site and

removing the builders rubbish. All were expected to provide their own lots. (In the case of Kikino, Fishing Lake and other lands dedicated to the Metis this was obtained from the Settlement council). Most families were prepared to pay for the further work that needed doing to complete the houses rather than do the work themselves, since they did not have a permanent on-site construction manager (who also acted as a trainer in CMHC Demo projects) and were not skilled, this is not particularly surprising.

There was no problem with the locally hired people or the sub-contractors who brought material in from Lac La Biche on demand, and no pilfering problems were serious enough to cause concern.

### 9. Training and Skills

Training was not provided for the families as they were not required to participate in the construction process, and skills of the participating families were not tested.

### 10. Construction Quality and Code Compliance

Most of the units were incomplete, but apart from the slight springiness in the floor of one unit (which is more of a CMHC standards fault than a construction error), the workmanship appeared to be up to normal builders' standards. The Alberta Building Code is in effect on the Settlement.

### 11. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 0 | 0 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 0 | 0 | 0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 60900 | 60900 | 54.9 |
| extra freight costs | 0 | 0 | 0 |
| equipment rentals | 1800 | 1800 | 1.6 |
| labour contracts | 48300 | 48300 | 43.5 |
| miscellaneous | 0 | 0 | 0 |
| Total Project Cost | 111000 | 111000 | 100.0 |
| Other Contributions: | | | |
| Clients | | 12000 | |
| Alberta | | 8000 | |
| Est.Actual Total Cost | | 131000 | |
| Land & Services (Deduct) | | -8000 | |
| **Est.Net Construction Cost** | | **123000** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 111000 | 37000 | 936 | 39.53 | 426 |
| Net Constr.Costs | 123000 | 41000 | 936 | 43.80 | 472 |

## Project Report: Garden River, Alberta

**Alberta Rural Home Assistance Program.**

Alberta Housing Officer: Alan Lamouche. (Phone interview)
Bill Bellrose (Phone interview)

### 1. Project Overview.

The project was not visited due to inclement weather which delayed the start of construction.

The Garden River Isolated Community is located 202 kilometres east of Fort Vermillion, Alberta. It is accessible by winter road. The 267 inhabitants of the community are both Metis and Treaty Status, many of whom are in need of improved housing. A project of four houses will be built.

Key dates include the following:

| | |
|---|---|
| Community information sessions | Jan 1988 |
| Project committed | |
| Materials contract awarded | Jan 1988 |
| Materials delivered on site | Jan 1988 |
| Work begins on site | Feb 1988 |
| First family moves in | * April 1988 |
| Work ended on site | * April 1988 |
| Project closed out | * April 1988 |

* Not completed at time of interview (29th Mar 1988).

### 2. Project Organization

The project was administered by the Alberta Home Assistance Program staff out of Slave Lake. Three tenders were received, and Pickardville Building Supplies was the successful bidder, offering a prefabricated system of 2"x 4" studs with 3 1/2" rigid foam insulation. The 12'-0" panels were trucked to Garden River from Pickardville, about an hour's drive north of Edmonton. Once delivered on the site, the Housing Association was heavily involved in the construction process, as in the selection of clients.

The Association contracted to have the raised gravel pads constructed. (The houses are designed for permafrost with standard 2-foot-high PWF foundation on a 2"x10" sleeper). It also hired five men and a foreman to erect the structure. One skilled staff carpenter was sent by the Rural Home Assistance Program office to help in the work for two weeks.

RHAP will conduct four or five technical inspections and there will be the same number of visits by the staff Construction manager and Housing Officers, not necessarily at the same time.

The Construction Manager was hired by RHAP and is a Cree-speaking person with a journeyman ticket in one of the construction trades. Although the work team

and a third-year apprentice were relatively unskilled, the package components were easily assembled. Payment is being made through the local Housing Association after a completion of each of four advisory housing inspections.

### 3. Community Selection

The community is extremely remote, and is within a National Park. It was selected mainly on the basis of need, but its location within the Park makes it of particular interest as it is the first time a community in the park has been served.

### 4. Clients

The selection of clients follows the usual criteria for the Rural Home Assistance Program; clients must be a family or a senior citizen household in need of improved housing. The applicants were required to complete an application; these were received by the Little Red River Housing Society which gave each a priority rating based on present accommodation, size of family and special conditions, such as burnouts, etc.

The clients selected were:

| Name | Adult | Childen | Former Accommodation |
|---|---|---|---|
| A | 2 | 8 | log shack |
| B | 2 | 3 | log shack |
| C | 2 | 5 | log shack |
| D | 2 | 9 | log shack |

### 5. Site and Servicing Issues

Garden River is located in the Wood Buffalo Park and is subject to stringent controls on waste disposal. There is a sewage lagoon and some grouped houses are served by a main sewer; the demonstration houses are not connected , although they will be in the future. There are negotiations going on with the Environment Department to arrive at an acceptable method of temporary sewage disposal. Piped water is available at all the houses.

### 6. House Designs

Standard RHAP designs were used, one three-bedroom bungalow (3B) of 936 sq. ft., three four-bedroom bungalows (4C) of 1,040 sq. ft. (The original intention was to use the "ADD-ON" system, but the packages could not be made available in time; the Plastispan system was substituted.)

### 7. Tendering and Materials Package

Three tenders were received, and Pickardville Building Supplies was chosen. The packages were delivered on site in January, in temperatures of -51oC with a stiff breeze blowing.

## 8. The Construction Process.

The clients worked alongside the hired labour on their houses. The houses will be completely finished with panelling and ceiling tile. Plumbing has been roughed-in, and forced air furnaces and wood stoves have been installed. Basic kitchen cabinets will be included.

## 9. Project Costs

**Table 2. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 40 | 40 | 0 |
| land | 0 | 0 | 0 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 2000 | 2000 | 1.3 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 300 | 300 | 0.2 |
| materials package | 105175 | 105175 | 70.2 |
| extra freight costs | 10000 | 10000 | 6.7 |
| equipment rentals | 0 | 0 | 0 |
| labour contracts | 30400 | 30400 | 20.3 |
| miscellaneous | 2000 | 2000 | 1.3 |
| Total Project Cost | 149915 | 149915 | 100.0 |
| Other Contributions: | | | |
| Clients | | 0 | |
| Alberta | | 15000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 164915 | |
| Land & Services (Deduct) | | 0 | |
| **Est.Net Construction Cost** | | **164915** | |

**Cost Breakdowns**

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 149915 | 37479 | 1008 | 37.18 | 400 |
| Net Constr.Costs | 164915 | 41229 | 1008 | 40.90 | 440 |

## 10. Training And Skills

Construction skills are reportedly not great. Garden River is quite remote and there is no construction around. The prefabricated house and the skilled people brought in to help are meant to overcome the lack of local skills.

## 11. Construction Quality and Code Compliance

The site was not visited but the project is regularly viewed by RHAP inspectors, and the good quality encountered on other projects may be expected here.

## Project Report: Paddle Prairie, Alberta

**Alberta Rural Home Assistance Program**

Housing Officers: Alan Lamouche (phone interview)
Bill Bellrose (phone interview)

### 1. Project Overview

The project was not visited.

The Paddle Prairie Metis Settlement is located 98 kilometres south of High Level, Alberta. It is accessible by a paved, all-weather road. There are 600 Metis people living in the Settlement, many of whom lack housing. Only one house will be built in the Settlement under this program. Key dates include the following:

| | |
|---|---|
| Community information sessions | Oct 1987 |
| Project committed | |
| Materials contract awarded | Nov 1987 |
| Materials delivered on site | Nov 1987 |
| Work begins on site | Nov 1987 |
| First family moves in | Dec 20th 1987 |
| Work ended on site, Project closed out | Dec 1987 |

### 2. Project Organization

The project was administered by the Alberta Home Assistance Program staff out of Slave Lake. The award for the prefabricated house went to 'Seven S' of Grande Prairie, Alberta. The package was delivered to the site in two lifts, and the manufacturer erected the shell as part of the contract. The area is relatively urban, and there are plenty of skilled tradespeople available. The owner of the house was also skilled and did about 50% of the finishing work. The rest was done by six local carpenters, including the chairman of the Housing Association. Also available was a qualified journeyman carpenter to look after the house construction, and the supplier assisted in the erection of the shell.

### 3. Community Selection And Clients

The community is regularly served by the RHAP, and its needs are well known. The client family was burnt-out on October 5, 1987 and urgently needed accommodation. The fire was caused by an electrical failure. The client selected was Mr. Randy Christian (2 adults, 3 children).

### 4. Site and Servicing Issues

There is no piped water or sewer available; the house is supplied with a septic tank system, and the water is delivered to the house cistern.

## 5. House Designs

The house is a standard RHAP, 3-bedroom, 936-sq.-ft. design. However the RHAP Agency is using a new type of system produced by the 'Seven S' company of Grand Prairie, Alberta. The stress-rated panel is constructed of 'Oriented Strand Board' (a specialized chipboard) of which both the spacers and facings are made. The panels are insulated with foamed-in-place polyurethane foam, for which R-8.33 per inch is claimed.

## 6. Tendering and Materials Package

Three bids were called and the contract was awarded to 'Seven S'. The award included erection of the shell.

## 7. The Construction Process

Once the shell was erected, finishing was completed by local skilled labour.

## 8. Training And Skills

Local skills were available; thus, training was not required.

## 9. Construction Quality And Code Compliance

Inspections are carried out regularly by the RHAP staff, and the system was constructed under a professional engineer to the standards of part 3 of the Alberta Building Code 1985.

## 10. Project Costs

**Table 1. Committed And Final Project Costs**

| | Initial | Final (est) | Final % |
|---|---|---|---|
| pre-dev. expenses | 0 | 0 | 0 |
| land | 600 | 600 | 1.5 |
| fees & permits | 0 | 0 | 0 |
| construction manager | 0 | 0 | 0 |
| construction manager exp. | 0 | 0 | 0 |
| tools | 0 | 0 | 0 |
| materials package | 27578 | 27578 | 69.9 |
| extra freight costs | 890 | 890 | 2.3 |
| equipment rentals | 800 | 800 | 2.0 |
| labour contracts | 9600 | 9600 | 24.3 |
| miscellaneous | 0 | 0 | 0 |
| **Total Project Cost** | **39468** | **39468** | **100.0** |
| Other Contributions: | | | |
| Clients | | 0 | |
| Alberta | | 3000 | |
| Other | | 0 | |
| Est.Actual Total Cost | | 42468 | |
| Land & Services (Deduct) | | -600 | |
| **Est.Net Construction Cost** | | **41868** | |

## Cost Breakdowns

| | Project$ | $/unit | Avg.Eq.Area | $/sq.ft | $/sq.m |
|---|---|---|---|---|---|
| Project Budget | 39468 | 39468 | 936 | 42.17 | 454 |
| Net Constr.Costs | 41868 | 41868 | 936 | 44.73 | 481 |

### 11. Views on the Project

The 'Seven S' system was liked by the Alberta staff, and they plan to use it again if it is found to be satisfactory in use, and if the present relatively high cost can be reduced to a competitive level.